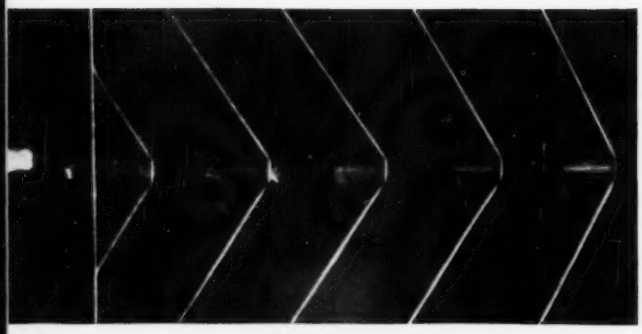
A McGRAW-HILL PUBLICATION

Chemical Week

Coming: coke from low-grade coal . . . . . p. 40



Two new cyclohexane makers spur competition for big market in nylon . . . . . p. 20

Bullets—new weapon in fiber research . . . p. 55

Wage floor going up? Coming Walsh-Healey hearings will likely hike minimums . p. 31

Blast sparks ammonium nitrate conflict. . . p. 75

January 16, 1960

STEVENS RICE GS
UNIVERSITY MICROFILMS INC
315 N 1ST ST
ANN ARBOR MICH
C
St

Presto change-o
with a bang!

Now industry has a brand-new and inexpensive tool for forming even the toughest metals into intricate shapes. Using plastic dies, hard-to-handle metals are blasted into shape with explosives.

Developed as a low-cost way to form metals into shapes such as spheres, cones, cylinders, and corrugated panels, this technique is made even more practical by Shell Chemical's tough Epon® resin. The smooth, impact-resistant surface of Epon resin dies form such metals as titanium and stainless steel to extremely close tolerances . . . costly hand finishing of parts is eliminated.

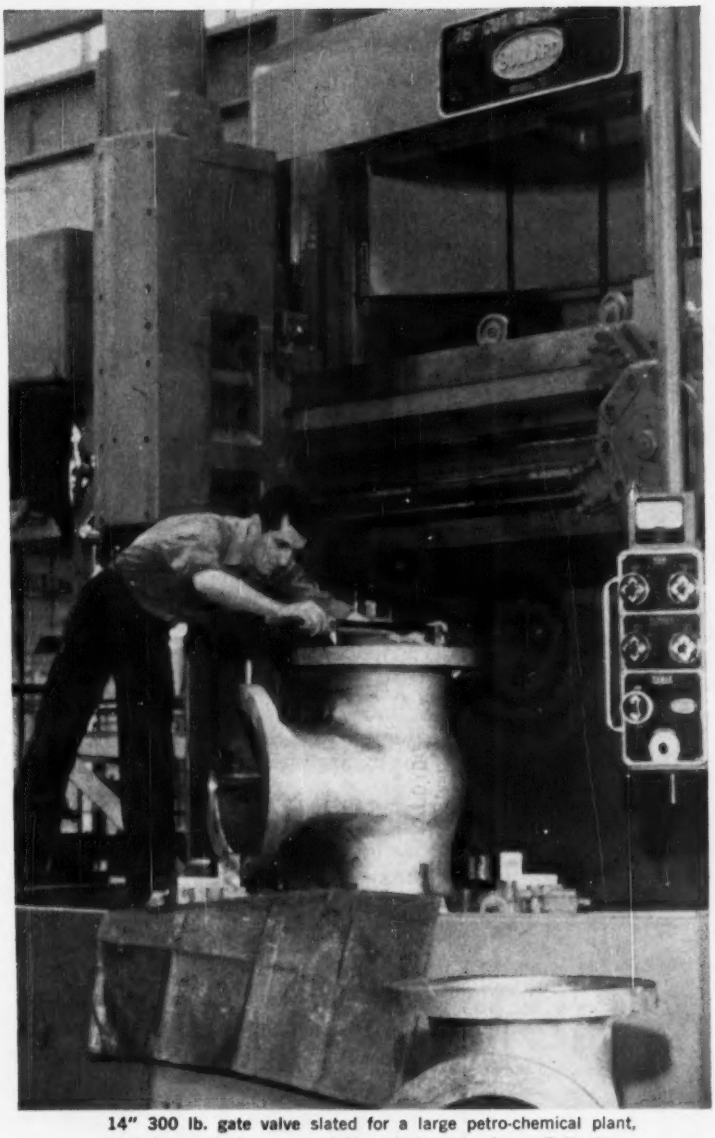
With Epon resins to shape metals into more useful forms for industry, Shell Chemical helps give shape to a world of things to come.

Shell Chemical Company

Chemical Partner of Industry and Agriculture

NEW YORK

SHELL



14" 300 lb. gate valve slated for a large petro-chemical plant, is being worked on one of Aloyco's battery of new Bullards.

Advanced machines... tools...test facilities expand Aloyco Valves' range of service

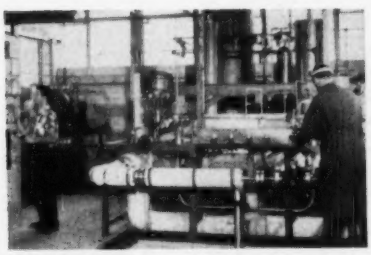
Constant change and improved techniques in modern fluid handling, pose a real challenge for valve manufacturers.

To meet these demands, Aloyco is constantly adding new facilities, some of which are pictured here.

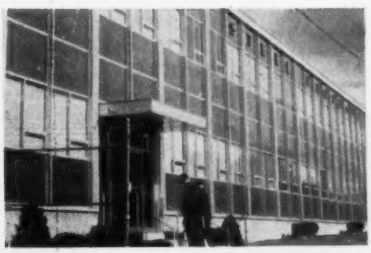
For example, Aloyco Stainless Steel Valves are now available in sizes up to 24", pressures up to 2,500 lbs. at 650°F.

While these new facilities have improved and expanded the quality and usefulness of our entire line, they are particularly important, for example, in the manufacture of valves for the nuclear and missile fields.

For advanced knowledge and ideas plus the equipment to carry them out – take your next valve problem to the specialists: Alloy Steel Products Company, 1328 West Elizabeth Avenue, Linden, New Jersey. 9.8



One of finest hot test loops in the nation checks out valves at up to 2500 psi, 650°F. Hot tests can spot trouble that would otherwise be revealed only after months of line service.



New multimillion dollar Aloyco plant combines new production tools, test facilities, sales, administration, research and development offices and labs into single integrated unit.

Boroscope examination (in pressurized clean room) of specially made nuclear valves follows the application of dye penetrant.

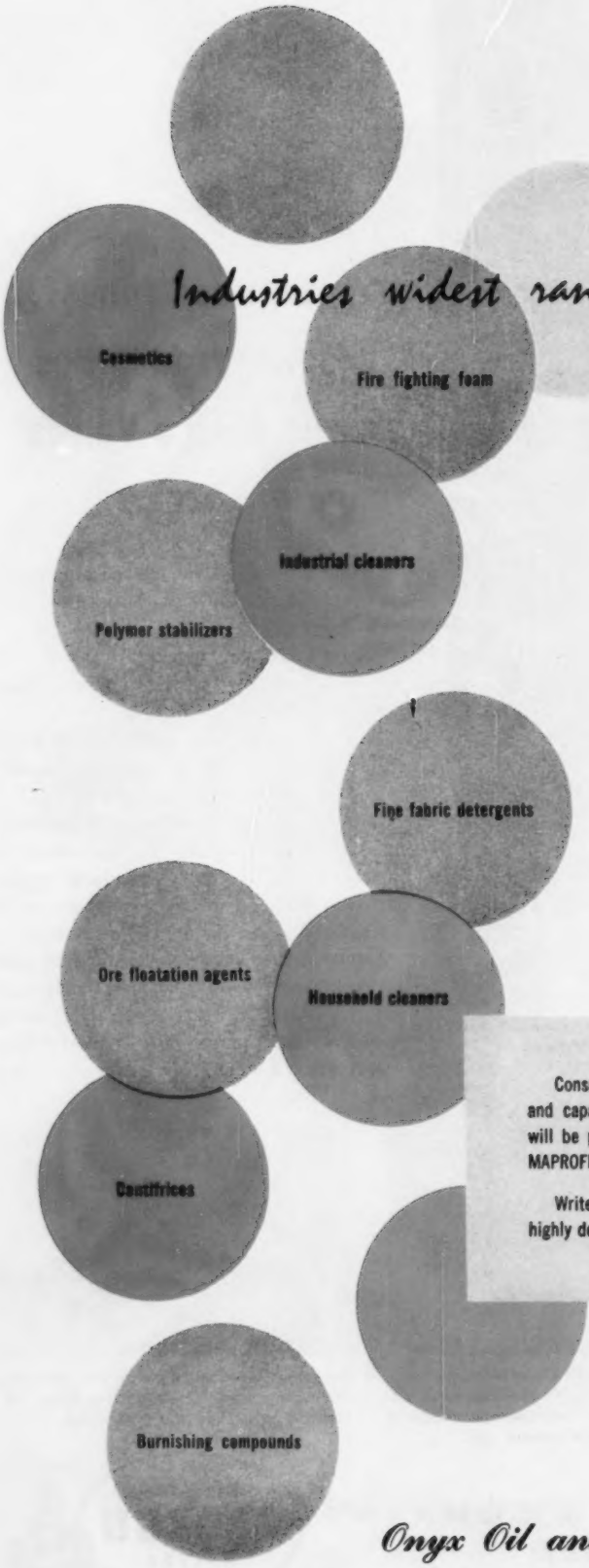
ALLOY STEEL PRODUCTS COMPANY

LINDEN, NEW JERSEY

Boston • New York • Wilmington • Atlanta • Birmingham • Baton Rouge • Buffalo
Pittsburgh • Chicago • St. Louis • San Francisco • Los Angeles • Seattle

Longer Lasting **ALOYCO VALVES**

1ST IN CORROSIVE SERVICE



Industries widest range of Lauryl Sulfates

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The Maprofix series of anionic surfactants . . . for use in dispersing or foaming or surfactant applications. Specially prepared by ONYX, the leader in lauryl sulfate technology. Highly surface active . . . easily soluble . . . excellent chemical stability.

There is a specific Maprofix available for every process or product requiring dense, stable foam or efficient dispersing.

Consult ONYX first on your specific application. Our large and capable research, development and technical service staff will be pleased to review your problems and suggest the ideal MAPROFIX compound to satisfy your every requirement.

Write for free 24-page booklet which describes our line of highly developed surface active agents.

50 YEARS OF SERVICE

ONYX CHEMICALS

Onyx Oil and Chemical Company

JERSEY CITY 2, NEW JERSEY

Chemical Week

TOP OF THE WEEK **JANUARY 16, 1960**

Celanese moves ahead on three fiber fronts with new nitrile, cellulosic and polyester ventures ..... **p. 21**

Import-export house moves deeper into manufacturing—story behind Huisking's acquisitions ..... **p. 47**

Fluorocarbon resin sales poise for big climb. New products, lowered prices will spur rise ..... **p. 65**

Chemical cleaning of process equipment booms, sparks formation of new Dow subsidiary ..... **p. 81**

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Steel—the strike nobody won. One gain: an opportunity to judge effectiveness of the "national emergency" provisions of the Taft-Hartley Act.

12 LETTERS

12 MEETINGS

17 BUSINESS NEWSLETTER

20 Cyclohexane competition grows, as Gulf, Conoco ready large new plants. Major outlet: nylon.

21 Celanese plays fibers field, acquires rights to Darvan (nitrile); starts production of new Arnel (cellulosic); joins ICI in polyester fiber venture.

22 Australia draws U.S. investments with five-fold boost in chemical output over 12 years.

23 Michigan Chemical bolsters drug interests by acquisition, expansion of research and development.

24 Recently organized Century Chemical stresses new products, overseas opportunities.

27 WASHINGTON NEWSLETTER

31 ADMINISTRATION
New and higher minimum wages for CPI workers will likely result from upcoming Walsh-Healey Act hearings.

34 Packagers, now forced to prove safety of materials they use, may shift on us to chemical suppliers.

40 ENGINEERING
New coking techniques may open Intermountain-area coal reserves. First to gain—phosphate producers.

47 SPECIALTIES
Importer-exporter Chas. L. Huisking & Co. turns to manufacturing to fatten profits.

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How fiber researchers are cutting test-tube-to-commercial-production time span.

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Ammonium nitrate industry faces mounting threat of unfavorable shipping regulation.

81 PRODUCTION
Chemical cleaning of process equipment gains in popularity. Rivals: makers of cleaning agents and contract cleaning outfits.

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45,531 copies of this issue printed

Vol. 86
No. 3

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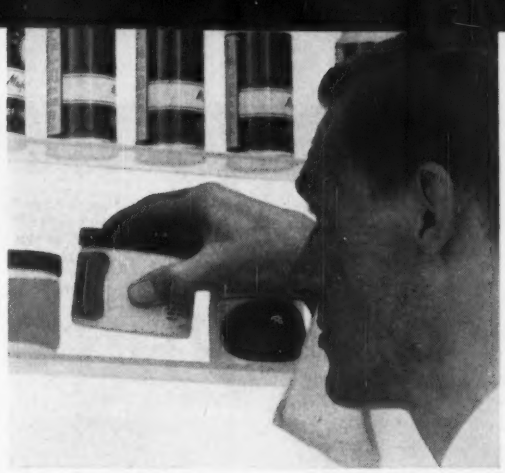
Postmaster: Please send Form 3579 to Chemical Week, 330 West 42nd St., New York 36, N. Y.

The many little extras in Emersol® Stearic Acid

We'll make a bold statement: Emery makes the finest stearic acid available. We admit other fine stearics come mighty close to matching some of Emersol Stearic Acid's characteristics—but why settle for a runner-up when Emersol brands cost no more. Thus, at no additional cost, you can obtain many little extras in product performance, which all add up to a big difference in customer satisfaction. You can prove it to yourself—for a sample of: Emersol 132 (triple-pressed); Emersol 120 (double-pressed); Emersol 110 (single-pressed); Emersol 140 (high palmitic); Emersol 150 (high stearic) send to Dept. A-1.

Women instinctively sense cosmetic quality from the color of the product. She likes white to be *really* white and pastel colors to be true and pure. Premium cosmetic manufacturers have proved she'll even pay a few cents more to get this extra luxury. So, to keep milady sold and protect their valuable brand names, many major cosmetic and toiletry producers use only Emersol 132, the *whitest* triple-pressed stearic acid available.

keep customers coming back for more



First class toiletries and cosmetics face a shelf life problem unless they contain a stearic acid with excellent *oxidation stability*. Emersol 132 Lily provides this important characteristic even throughout long storage periods. This means more protection against deterioration resulting from changes in color, clarity, emulsion stability, texture and consistency.

Pure? You bet! Drug companies use only the very *purest*, the very finest stearic acid in their pharmaceuticals. And, that's why many of them specify Emersol 132 (which exceeds U.S.P. standards) and will accept no substitutions.

For table charm, a trim, sturdy candle—straight as a light beam and whiter than the cloth it graces. Once again Emersol pressed-type stearic acids, with an unvarying crystalline structure, get the credit. These crystalline stearic acids form a strong, unyielding candle. And, by shrinking just the right amount, they separate cleanly from the mold and eliminate breakage.

Making clothes soft and WHITE poses special problems. The strong acids and intense heat used in manufacturing tend to discolor textile softeners derived from stearic acid. So, quality conscious softener producers look for a high degree of *color stability* in the stearic acid they order—and Emersol Stearic Acids usually get the nod. Color stability is one of their most outstanding characteristics.

Emery

FATTY ACID SALES DEPARTMENT

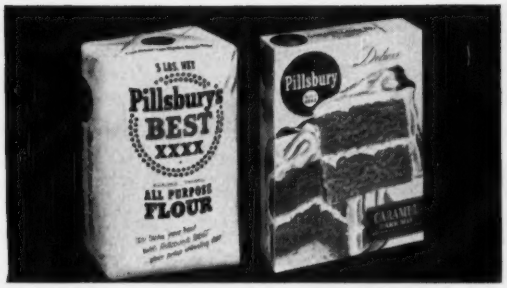
Emery Industries, Inc., Carew Tower, Cincinnati 2, Ohio
Vopcolene Div., Los Angeles—Emery Industries (Canada), London, Ontario—Export Department, Cincinnati

CYANAMID

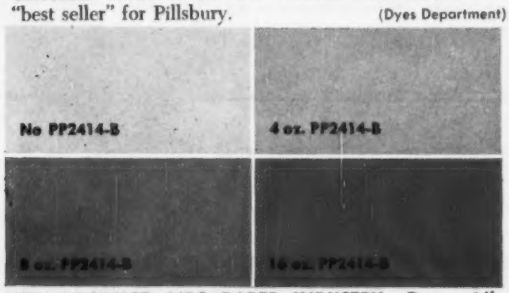
Chemical Newsfront

BOON TO BATHING BEAUTIES. Cyanamid's ANTIOXIDANT 425® works ceaselessly to protect clean, white, strong rubber thread—essential component of bathing suits and other "stretch" garments—against the loss of elasticity- and strength-sapping ravages of oxygen. Unrivaled in its non-staining characteristics, Antioxidant 425 also assures the ultimate in long-lasting whiteness.

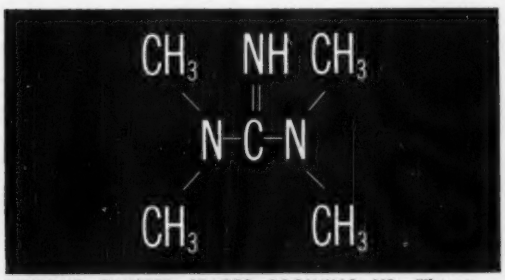
(Rubber Chemicals Department)



PILLSBURY PACKAGES PACK A NEW PUNCH: In that hot war for supermarket shelf space, these two Pillsbury packages have scored an impressive victory by adding Cyanamid's CALCOFLUOR® White brightener to the paper and board stock. The whiter-white base that Calcofluor provides makes package colors come alive, makes printing pop, suggests added quality and cleanliness, invites faster impulse buying . . . demands shelf exposure. Calcofluor White is the new Hidden Persuader, a new "best seller" for Pillsbury. (Dyes Department)



NEW PRODUCT AIDS PAPER INDUSTRY. Cyanamid's Paper Product 2414-B, a water soluble polyacrylamide resin, is now being used in the paper industry to improve the retention of fines and pigments. In addition to reducing costly waste of pigments, other benefits are: more even coloring on both sides of the sheet, faster machine drainage, and less stream pollution from pigments. Its effectiveness as a pigment retention aid is demonstrated in the photo above. The four handsheets contain equal amounts of colored pigment while the PP2414-B content varies from zero to 16 ozs. per ton of paper as indicated. Conversely, color specifications may be maintained by the addition of PP2414-B in appropriate amounts while reducing the pigment content. (Paper Chemicals Department)



TONGUE-TWISTER STARTS GROWING UP. This is a significant year for Cyanamid's *Tetramethylguanidine* (TMG). Last year, the formula for TMG appeared here as a new chemical available for research only. Now it may be ordered in drum quantities. TMG is a liquid with a slight ammoniacal odor. It boils at 159-160°C and is soluble both in water and organic solvents. Chemists in need of a strong, all-organic base should find these properties worth evaluating. (Market Development Department)

CYANAMID

AMERICAN CYANAMID COMPANY

30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

NEWS AT A GLANCE

New spray-on antibiotic ointment has been developed by Cyanamid's Surgical Products Division. Called Surgamycin® Topical Spray Ointment, it is used in local treatment of infections—may be applied to wounds, abrasions, ulcers, draining sinuses, and similar superficial lesions, as well as to burns. The ointment requires no preparation time, may be stored without refrigeration, and produces a uniform covering when sprayed on the affected area...Utah State University, the Utah Turkey Federation, and Cyanamid are joining forces to combat staphylococcus infections which kill 100,000 turkeys a year in the U.S. The program will be carried out under a Cyanamid grant to the University...Cyanamid's Malathion insecticide has been accepted by the USDA for the control of horn flies on dairy cattle. It is the first phosphate insecticide to be cleared for such use. Greater safety and economy in coal mining are the advantages of multiple firing of explosive charges with Cyanamid's Coal King* delay electric blasting caps. The Coal King caps detonate complete rounds of permissible explosives—obviate the need for the shotfirer to return to the face between blasts, as in single-hold blasting. This results in reduced exposure of the shotfirer to dust, fumes and roof fall hazard...Cyrea®, Cyanamid's new feed-grade urea is now available. Produced at the Hamilton, Ontario plant, Cyrea is a microprilled product with non-caking and non-bridging properties.

*Trademark

For further information on products in this advertisement wire, 'phone or mail this coupon to:

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30 Rockefeller Plaza, New York 20, N. Y.

Please send me additional information

- ☐ ANTIOXIDANT 425
- ☐ CALCOFLUOR
- ☐ PAPER PRODUCT 2414-B
- ☐ CYREA
- ☐ TMG
- ☐ MALATHION
- ☐ COAL KING CAPS

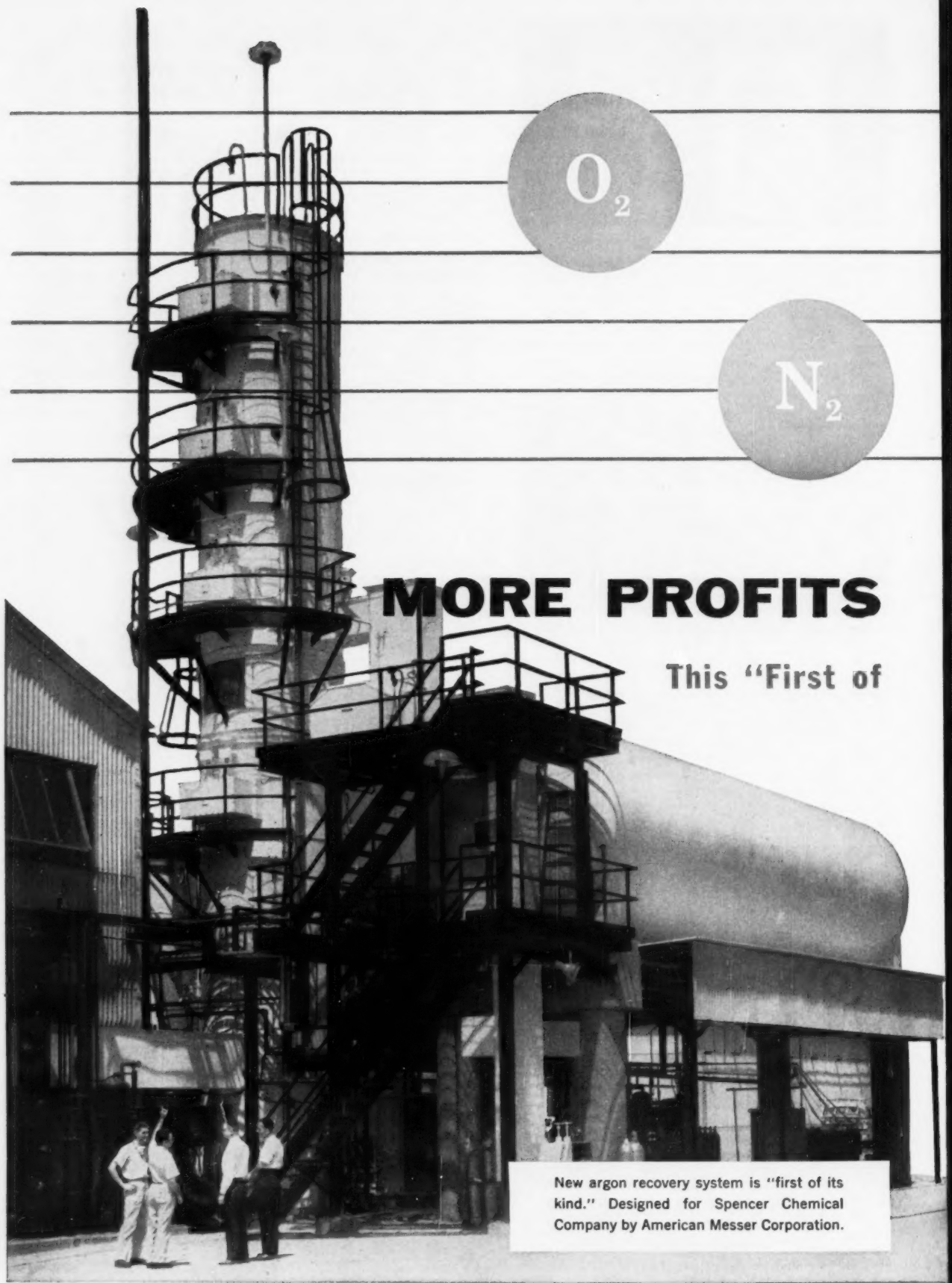
Name_____

Company_____

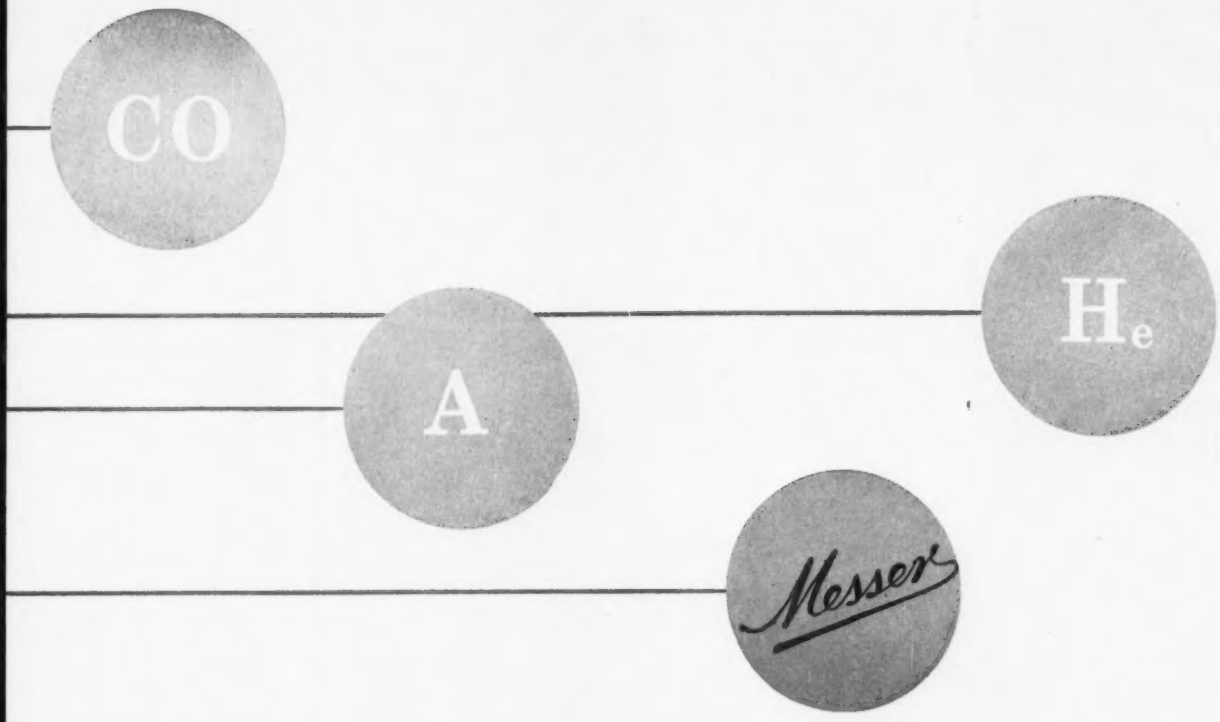
Position or Title_____

Address_____

City_____ Zone_____ State_____



New argon recovery system is "first of its kind." Designed for Spencer Chemical Company by American Messer Corporation.



IN AIR SEPARATION?

Its Kind" Plant May Give YOU Some New Ideas

How to make an air separation plant more profitable is illustrated by a recent accomplishment of Spencer Chemical Company. Through a new cryogenics system, Spencer now turns out substantial quantities of Argon from its Vicksburg, Miss. operation originally designed for making ammonia.

Spencer Selects American Messer

Spencer asked American Messer to investigate the possibilities of augmenting the ammonia plant's facilities to manufacture argon. Messer went to work. It undertook the design of a unique process to achieve the results Spencer was seeking.

What happened? Today this Vicksburg plant produces 3,000,000 cu. ft./mo. of ultra-pure argon from what was formerly a waste stream from the syn gas nitrogen scrubbing section of the ammonia operation.

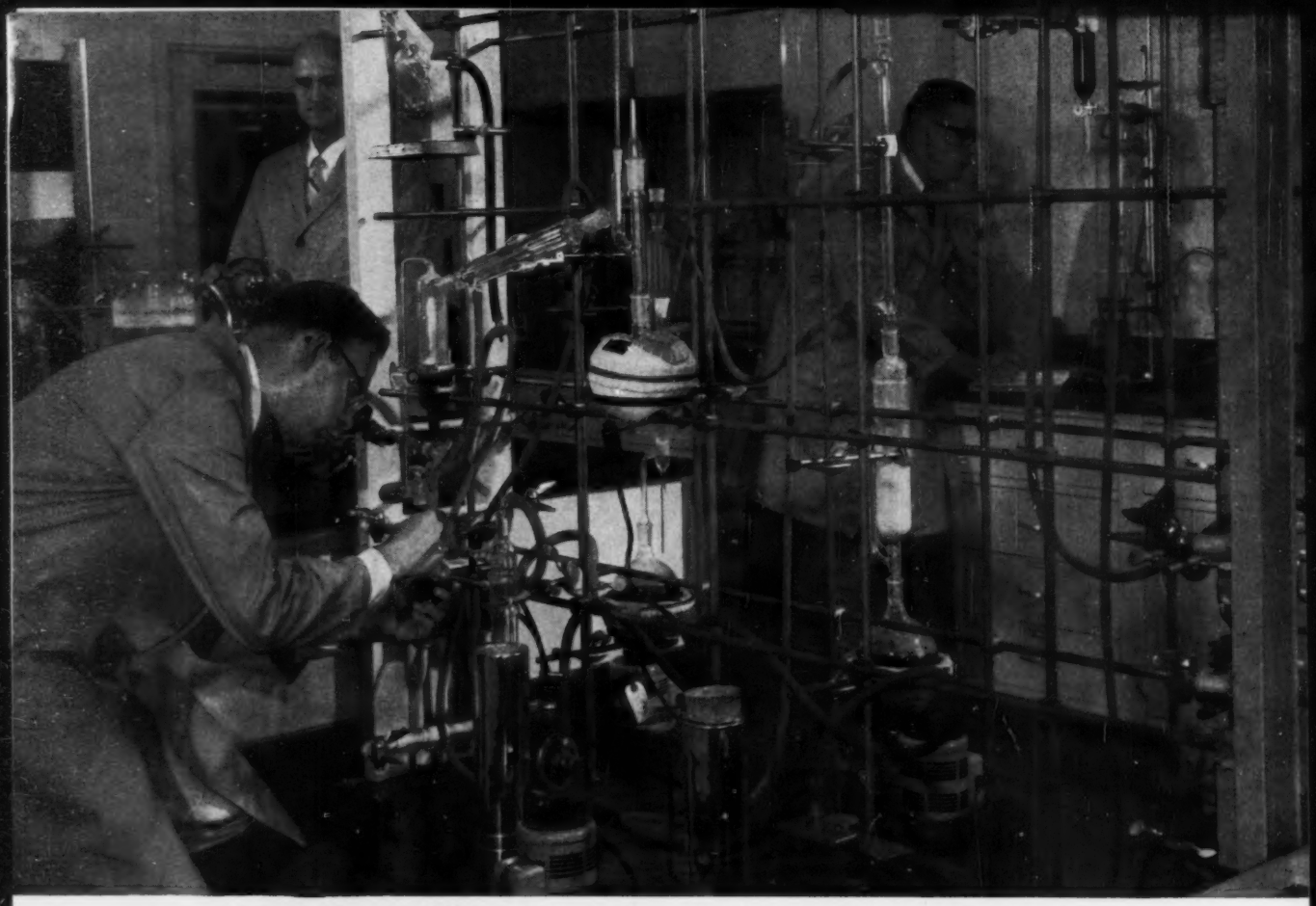
This method permits much higher recovery of argon from the ammonia producing process than was previously possible by air separation techniques. Yet it in no way influences or upsets the balance of oxygen and nitrogen production important to the basic function of the plant-making ammonia.

Interested In Oxygen, Nitrogen, Argon, Helium?

American Messer is equipped and ready to consult with anyone whose manufacturing process could benefit from a more efficient and economical use of cryogenic processes. Be sure of the finest technical counsel! Your inquiry will be welcomed. American Messer Corporation, Chrysler Building, 405 Lexington Avenue, New York 17, N.Y.

AMERICAN MESSER CORPORATION

THERE IS NO SUBSTITUTE FOR MESSER EXPERIENCE



Shown here is one of 13 completely equipped new laboratory units which Neville has recently built as part of a move to bolster basic research. New products are born here—old ones improved.

New Neville Research And Service Facilities Mean Better Products For You

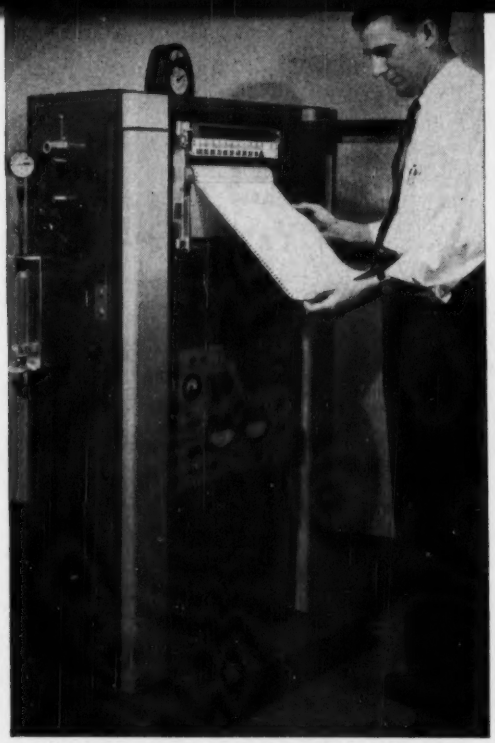
When Neville Chemical Company built its unique office building and research center on Neville Island in Pittsburgh, it did so with its customers in mind. It placed all research, technical service, general administration, sales and even a pilot plant under one roof for quick communications and good coordination. This adds up to better and faster service for you.

Technical facilities were greatly enlarged and divided into four basic sections . . . Technical Service, Research, Process Development and Laboratory Service. In the last three departments, Neville scientists and technicians are constantly striving to find new polymers and chemicals to increase the ability of Neville products to improve those of its customers. In addition, these departments are concerned with the development of new processes, pilot plant studies and analytical research. Through the efforts of this group, Neville developed the country's first commercial process for the production of high purity Indene and Indene derivatives.

The Technical Service Department spends a large measure of its time in technical assistance to our customers. Whether their products are rubber goods, coatings, floor materials, adhesives or any other, Neville studies them for application with our products and for possible improvement. The people in Technical Service pride themselves on often solving problems before customers are aware of their existence.

Neville's thirteen completely new and modern laboratory units function alike for basic research, process development, technical service, laboratory service, and isolating new chemicals or polymers. The laboratories are arranged in a continuous double line with the advanced design pilot plant at the end. Thus, when new polymers have been discovered and studied, they subsequently proceed from one step to the next and continue down the hall to the pilot plant where the commercial feasibility of manufacture is established. In addition to this, the Quality Control Laboratories, which maintain separate quarters in the plant, are constantly at work checking to be certain that every Neville product will conform accurately to specifications.

Much of the benefit of Neville's new facilities could not be readily translated into customer profit were it not for the work of the technical representatives. These highly trained men act as liaison between your plant and the new Neville Island Center. You will find it pays to ask a member of this technical service staff to visit you and bring your formulation problem back to the laboratories for solution.



In the basic research department of Neville's new center, scientist takes a reading from a new Chromatograph to separate and determine chemical components. Not shown is an advanced new infra-red spectrophotometer for even closer identification.

In a room with specially controlled humidity and temperature, an Instron Testing Machine determines the tensile, modulus, elongation and flexual strengths of basic materials from 4 lb. to 10,000 lb. load.

Under constant use at Neville is a Weather-O-Meter in which samples of rubber goods, coatings and many other products undergo aging under accelerated weather conditions.

Key men in translating Neville's new facilities to better service are its corps of technical representatives. One member of this highly-trained field staff is shown here assisting a customer.

Resins — Coumarone-Indene, Heat Reactive, Phenol Modified Coumarone-Indene, Petroleum, Styrenated, Alkylated Phenol • **Oils** — Shingle Stain, Neutral, Plasticizing, Rubber Reclaiming • **Solvents** — 2-50-W Hi-Flash*, Wire Enamel Thinners, Nevsolv* • **High Purity Indene.**

*Trade Name

NEVILLE CHEMICAL COMPANY

Pittsburgh 25, Pennsylvania

Plants at Neville Island, Pittsburgh, Pa., and Anaheim, California

NEVILLE®

VIEWPOINT

Steel—Nobody Won

DID THE UNION WIN THE STEEL STRIKE? If you take the statements of Steelworkers President David McDonald at face value, the answer is yes. But any nonpartisan observer must conclude that the workers lost at least as much as the companies. For it will take much longer than the 30 months of the new contract for the workers to make up their out-of-pocket wage losses.

There's a point even more important to the steel workers: because of freight charges, etc., foreign producers have traditionally been at a marked disadvantage in trying to sell in the U.S. But in recent years, this has changed. Even before the steel strike, imported steel bars, delivered in Cleveland, cost 32% less than the same product made there. Last week's steel settlement will further increase the differential between wages of U.S. and foreign steelworkers. The steelworker in the U.S. further jeopardized his job security.

And management? It came off worse than its employees. The wage "package" cost was a compromise, halfway between both offers. But there'll be no changes in work rules, new penalties for wildcat strikes, or flexibility in scheduling vacations.

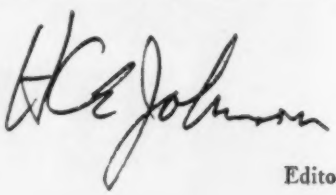
And how did the public fare? The best that can be said here is that there won't be another steel stoppage before June '62. There is some comfort, too, that much of the inflationary effect of the increase is delayed; the first cash wage increments will be paid Dec. 1. Presumably, any broad increase in steel prices will also be deferred.

The settlement does, of course, carry one definite benefit: it makes unnecessary any hurry-up remedial action by Congress. Thus, there's no threat of a law that would have either (1) established compulsory arbitration, (2) set up a system of labor courts, or (3) made negotiation mandatory in emergency situations. Such a spur-of-the-moment amendment to the Taft-Hartley Act's national emergency provisions would not have solved anything.

The major shortcoming in Taft-Hartley is its inflexibility. The President must satisfy himself that there is a national emergency before appointing a fact-finding board; if the board agrees that there is an emergency, a court is asked for an 80-day "cooling off" injunction; just before its expiration, strikers must vote on management's last offer. Only after the injunction expires, and a strike resumes, is the President directed to make recommendations to Congress as to further action.

This Taft-Hartley straightjacket guarantees that nobody will reveal final bargaining terms early in negotiations. And in the case of steel, Taft-Hartley failed completely. A settlement was reached only because it was brought home to labor and management that Congress would have passed legislation neither would want.

Since there is now no pressure on Congress for immediate action, this is an ideal time to explore ways of building flexibility into the too-rigid procedures for handling national emergencies. The nation can't afford the cost of another strike like the one just ended.



Editor-in-Chief

LETTERS

Franklin's Smog Studies

TO THE EDITOR: You state (*CW Technology Newsletter, Dec. 5*) that The Franklin Institute Laboratories are continuing smog-control studies "under the sponsorship of the Air Pollution Foundation."

. . . Our studies are certainly continuing, but with our own financial support. The foundation is not now sponsoring this work. . . .

EDGAR H. NELSON
The Franklin Institute
Philadelphia

'Business as Usual'

TO THE EDITOR: Your article, "Business as Usual in Plant Run by Blind" (*CW, Nov. 7, '59, p. 53*), tells a most interesting story of a unique soap company in Stockholm, Sweden.

You mentioned, however, that "checks with American organizations for the blind and with state agencies disclose no comparable businesses in the U.S." I should like to call your attention to a company, Products of the Blind Workers, Inc. (39-39 63rd St., Woodside, N. Y.), which operates in a similar fashion to the Swedish company mentioned in your article. We have worked closely with this organization and have watched its progress and growth for several years. It manufactures soap, shampoos, colognes and toiletry products, handling this operation with a staff of which more than 75% is totally blind.

C. P. WALKER
President
International Flavors & Fragrances Inc.
New York

MEETINGS

Engineers Joint Council, annual meeting, New York, Jan. 22.

Symposium on High-Speed Testing, second annual technical sessions, Somerset Hotel, Boston, Jan. 27.

American Rocket Society, solid propellents conference, Princeton University, Princeton, N.J., Jan. 28-29.

Instrument Society of America, instrument and automation conference and exhibit, Sam Houston Coliseum, Houston, Tex., Feb. 1-5.

Should you . . . or shouldn't you use pallets?

ELIMINATING PALLETS . . . *appears* to offer obvious savings. The many new attachments in use for this purpose makes the idea even more attractive. However, many possible pitfalls face even the experienced materials handling man.

YOUR DECISION should be based on a careful analysis by specialists who have had broad experience with such conversions. Your local Clark dealer, for example, is able to offer you not only his own specialized knowledge, but in addition, that of a team of Clark engineers who have dealt with countless companies on the same subject.

THE COMBINATION of specialized knowledge, a complete line of equipment (including *all* power types), plus a full line of job-engineered attachments, gives your Clark dealer an opportunity to present you with a completely unbiased, and carefully documented recommendation.

REDUCING COSTS is of prime consideration. The elimination of pallets in your operation may prove to be the quickest, soundest way of accomplishing this objective. It's worth investigating. Contact your local Clark dealer, listed in the Yellow Pages under "Trucks, Industrial" or, if you prefer, write: Engineering Aid, Clark Equipment Company, Battle Creek, Michigan.

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ARGUS MAKES VINYLS BEHAVE!

Can you control the behavior of vinyls? Argus says "yes."

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THE BUSINESS MAGAZINE OF THE CHEMICAL PROCESS INDUSTRIES

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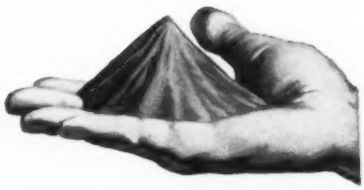

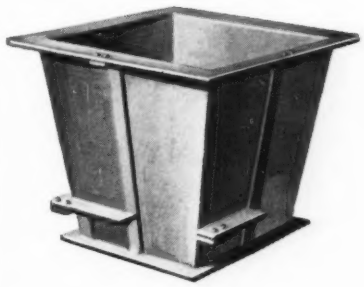

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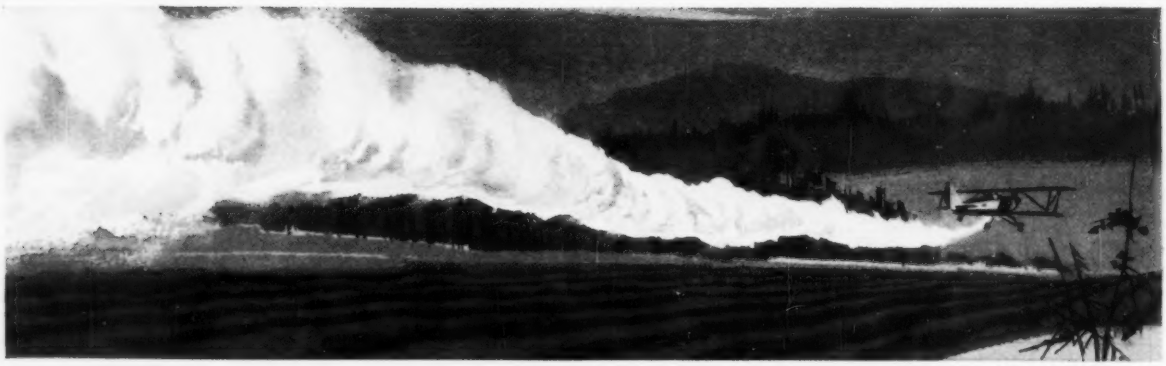

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Business
Newsletter

CHEMICAL WEEK
January 16, 1960

With nylon gaining in the tire cord market battle, Allied Chemical's National Aniline Division this week is stepping up production of nylon-6 yarn for auto tire cord. Also planned: a third expansion of caprolactam monomer facilities at Hopewell, Va.

Allied says it will triple its Golden Caprolan yarn production. And while the company last year increased caprolactam monomer capacity to 60 million lbs./year, and later to 84 million lbs./year, Allied now says plans for 1960 call for "further substantial expansion" as the $300-million rayon vs. nylon struggle rages on. Both nylon 6,6 and nylon-6 are pitted against rayon tire cord for acceptance in original equipment tires.

But far from giving up, rayon producers even look for growth in '60. American Tyrex Corp. (New York)—a group of five rayon producers formed in '58—says it will "fight back with intensified efforts in rayon tire cord promotion." Substantiating present growth hopes: a gain of an estimated 50 million lbs. of rayon consumed in tire cord in '59 over 240 million lbs. used in '58.

Rayon producers, however, declined to comment on what's happening to rayon profits now that nylon tire cord prices have pushed below the $1/lb. mark.

While nylon makers hold that their products have better initial yarn strength, and are lighter and more moisture resistant, rayon producers claim stronger finished plies and better ride qualities.

•

The program of fast tax write-offs that has now ended provided certificates for the chemical industries covering 60% of $3 billion worth of plant and equipment. The idea, of course, was to give industry tax deductions to help finance industrial expansion.

Other basic industries came out with about the same tax break: The petroleum industry, for instance, also got certificates covering 60% of an estimated $3 billion of plant; primary metal producers got a 70% write-off—$6 billion of plant expansion.

•

Responsibility for drug adulteration is placed on the laboratory that tested the drugs, not the manufacturers, in a 10-count criminal information filed by the Justice Dept. last week in U.S. district court at Philadelphia. On the basis of reports prepared by defendant Wyanel Laboratories (Philadelphia), several producers shipped drugs in interstate commerce with labels that inaccurately stated potency. The government found that the potency fell below the level set in the "Pharmacopeia of the U.S." This makes them adulterated under the Federal Food, Drug and Cosmetic Act. Wyanel says it has never knowingly approved adulterated drugs for distribution in interstate commerce.

Plastics companies are gearing for higher sales next year —whether a 10% or 15% sales gain is ahead (*see p. 72*). Three firms this week are setting up expansions throughout the U.S.:

• Borden Chemical Co. (New York) will build a new polyvinyl chloride plant in Illiopolis, Ill. Rated capacity: 40 million lbs./year. A full line of PVC and copolymer products, including those for the vinyl flooring industry, will be produced for growing Midwest markets. Late last year, Borden expanded its Leominster, Mass., PVC plant to 40 million lbs./year.

• Polymer Industries, Inc. (Stamford, Conn.), is beginning construction of a $500,000 polymerization and solvent-mixing plant at its new Springdale, Conn., production and laboratory facilities. Main products: adhesives for the fast-growing packaging industry.

• Continental Can Co. (New York) has set up a Plastic Bottle and Tube Division in Chicago. The company disclosed that plastic bottle volume has developed to the point where the firm plans to establish "both East and West Coast manufacturing facilities, and a plant at another location in the Midwest."

•

U.S. companies moving into the "Common Market" are running into competition among themselves as well as from European producers. Case in point: the titanium pigment field. About a year ago, National Lead, already established with a plant in Leverkusen, West Germany, reinforced its position by buying controlling interest in Societe Chimique des Derives du Titane (Langerbrugge, Belgium). Last month, Du Pont stepped in by forming a joint subsidiary with Sachtleben AG (Cologne) to produce titanium pigments at a new, 40-million-lbs./year plant.

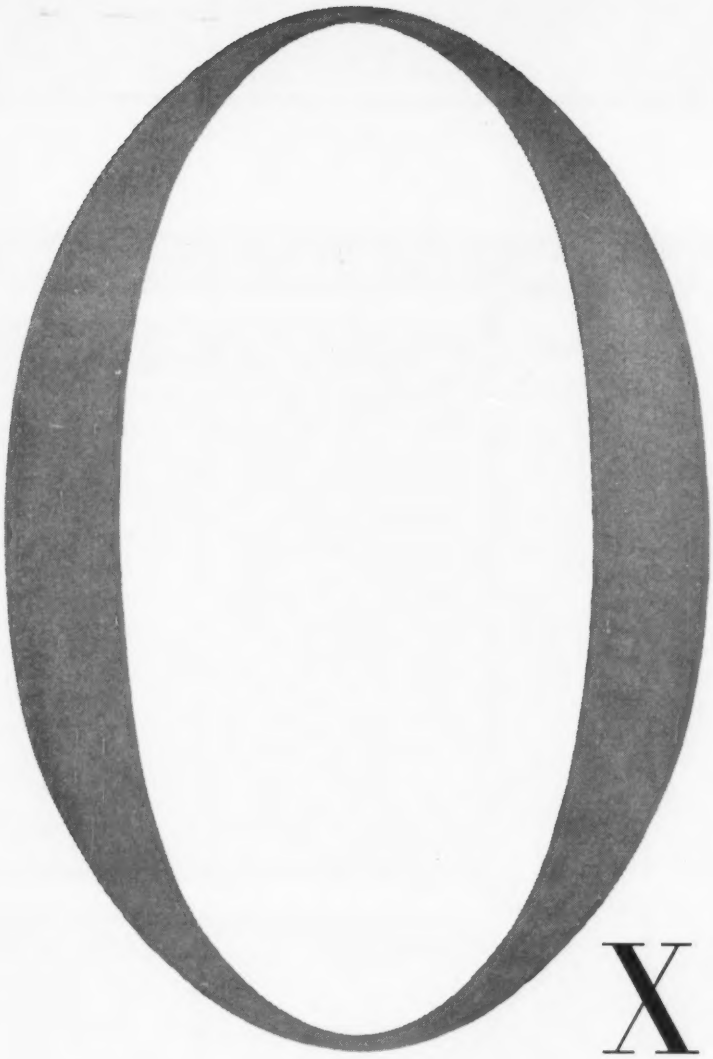
Now Cyprus Mines Corp. (Los Angeles) is getting into the act through the subsidiary it owns with Albatros Superphosphate Factories —Albatros Sulphuric Acid and Chemical Factories (Utrecht). With Billiton Co. (The Hague), Albatros Sulphuric will put up a titanium dioxide plant near Rotterdam. Initial capacity: 10,000 tons/year. Technology will come from Glidden.

•

Hercules Powder is about to acquire Imperial Color, Chemical and Paper Corp.—a move that would boost Hercules' annual sales to more than $300 million. The acquisition—if approved by stockholders of both companies—would also mean that Hercules would be diversifying into inorganic pigments.

Imperial—a 58-year-old concern headquartered in Glens Falls, N.Y.—is a major producer of pigment colors for use in paints, plastics, printing inks and synthetic fibers; it also produces wallpaper. Its estimated '59 sales: $27.1 million; earnings: $1.9 million.

Hercules—whose last previous major acquisition was Huron Milling Co., producer of wheat starch and proteins—estimates that its '59 sales were up 18%, to about $280 million, and that earnings climbed 34%, to $23.5 million.



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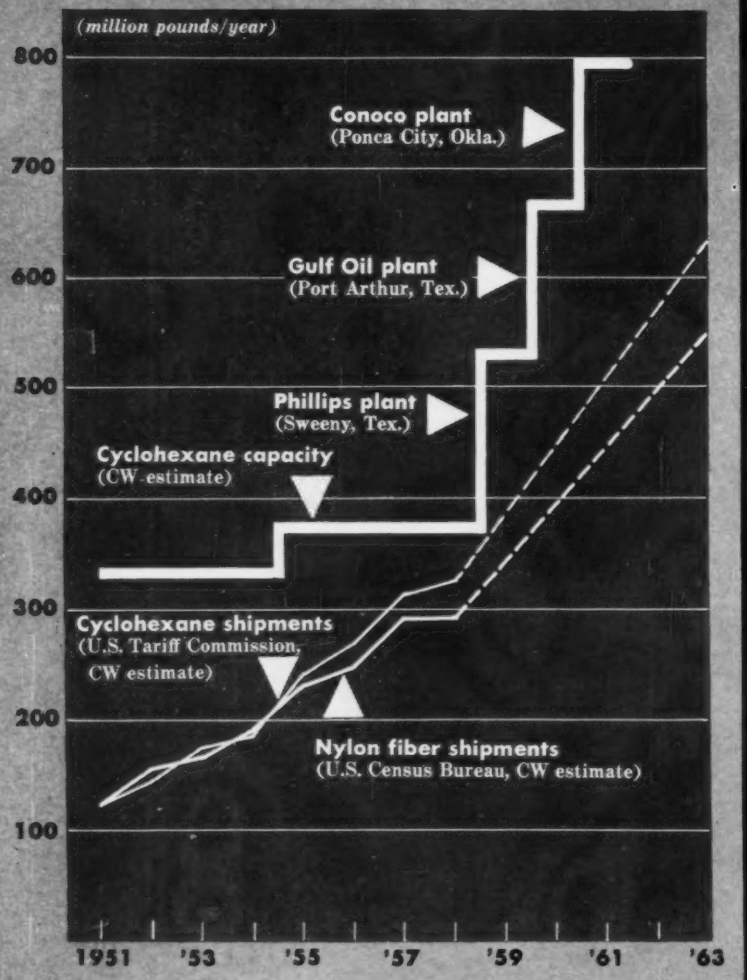
Cyclohexane Capacity, Output Step Upward



Cyclohexane at a Glance

Where It Comes From

Producer and Location	Annual Capacity (million pounds)
Phillips (Sweeny, Borger, Tex.)	240-325
Du Pont (Belle, W. Va.)	195
Shell (Wilmington, Calif.)	32-65
Gulf Oil* (Port Arthur, Tex.)	130 (est.)
Continental Oil† (Ponca City, Okla.)	130
Total	800

*Due onstream Feb. '60; †Due onstream Sept. '60.

Where It Goes

Outlet	Share of '59 U.S. Consumption (est.)
Nylon–6, 6	90%
Solvent (principally in production of linear polyethylene)	6%
Plasticizers	4%
	100%

Scramble's on in Cyclohexane

Phillips Chemical is facing brisk new competition this week in a field in which it has been pre-eminent for more than a decade. The shake-up, in what has been a relatively safe market for Phillips, is the result of major cyclohexane projects by two other big petrochemical producers: Gulf Oil is planning to go onstream Feb. 1, at Port Arthur, Tex.; and Continental Oil is building a plant in Ponca City, Okla., scheduled to start up late this year *(CW Business Newsletter, Jan. 9)*.

Phillips began production in 1946 at Borger, Tex. Its first high-purity (98%) cyclohexane became available in 1956; in May of last year, its second cyclohexane plant—doubling capacity—came onstream at the company's big Sweeny, Tex., refinery.

Cyclohexane, used primarily for manufacture of nylon-6,6, has received little public notice since its initial production in this country by Du Pont in the 1930s. It's still not made commercially anywhere else in the world, and reliable capacity and demand figures are practically nonexistent.

Du Pont and Chemstrand — the

leaders in nylon — are the two big consumers. Du Pont of Canada gets all its cyclohexane from the U.S. and Monsanto buys some cyclohexane for making adipic acid and plasticizers.

Phillips has been supplying Du Pont, which fulfills some of its requirements from captive production at Belle, W. Va.

Phillips also claims a sizable share of Chemstrand's business. And Shell, which began producing cyclohexane at its Wilmington, Calif., refinery in the late '40s, has also been selling to Chemstrand.

Now, both Conoco and Gulf will reportedly be selling to Chemstrand. Upshot: a possible big cut into Phillips' cyclohexane sales to the latter. Phillips declines to comment on this. And Shell, whose facilities are so far from markets in the South and Southwest, is reportedly no longer a contender.

Chemstrand is apparently ensuring its supply by dividing its contracts. The company relies on only one nylon process—which uses cyclohexane to make adipic acid and hexamethylenediamine (HMD). Du Pont, on the other hand, has several chemical routes to HMD—via its own cyclohexane, butadiene and furfural.

Cyclohexane makes good sense to Gulf, which has been looking for an outlet for its benzene. Gulf will make cyclohexane by hydrogenating benzene via a process developed by Universal Oil Products. The contract price of the former is about 4¢/gal. higher than that of benzene.

Conoco's 20-million-gal./year Ponca City unit will also hydrogenate benzene.

Projected price of cyclohexane set by Gulf and Conoco is below that of Phillips' product largely because of lower freight charges. The two new units, closer than Phillips' to big nylon plants, will sell cyclohexane for 30-35¢/gal.—a price that should discourage (at least for a while) further oil-company entrants.

But an Esso spokesman offers another viewpoint: "At present prices, cyclohexane is not a very attractive venture, if you can dispose of benzene without hydrogenating it. For those who can fractionate it out of a stream, cyclohexane can be profitable; but we feel present prices don't justify hydrogenation." If Esso encountered trouble in moving benzene, its attitude toward cyclohexane could well change.

The benzene market is of little concern to Phillips—both of its plants use natural gas liquids as raw material.

Glowing prospects for nylon bode well for cyclohexane. About 90% of the cyclohexane now consumed in the U.S. goes into nylon-6,6 manufacture. But cyclohexane can also be used in production of caprolactam for nylon-6. The first plant in the world to manufacture nylon-6 from cyclohexane is now being built by Du Pont at Beaumont, Tex. And proliferation of such plants is anticipated.

Allied Chemical, a nylon-6 producer, finds its own phenol a less costly raw material — but recent studies indicate that the cyclohexane process for nylon-6 will be more economical for companies lacking captive phenol.

And cyclohexane will also benefit from expanding linear polyethylene production. (It's used as a solvent in the manufacture of Phillips-type, low-pressure polyethylene.) If linear polyethylene output reaches 300 million lbs./year—not unlikely in the next few years—cyclohexane consumption by this application will amount to 30 million gal.

It's also used in limited quantities as a paint and varnish remover, for extraction of essential oils, and for oxidation to cyclohexanol.

And new uses are in prospect. Case in point: a new Union Carbide epoxy resin based on cyclohexane-derived cyclohexanone. "From a structural standpoint, cyclohexane is a highly promising material," says one research executive with more than a passing interest in the chemical. His prediction: "Cyclohexane will almost certainly pop up soon in several new applications."

But one thing is certain: the race for future cyclohexane sales, and profits, will be at least a three-way scramble.

Two New Fibers Debut

Celanese Corp. of America this week is moving in two directions in the fiber field: the company is (1) expanding its Celriver plant at Rock Hill, S.C., for production of "an improved Arnel fiber"; (2) preparing to launch production of Darvan, the nitrile fiber acquired last week from B. F. Goodrich Chemical Co.

Greater strength of new Arnel 60 makes it particularly useful in woven goods, according to Celanese spokesmen, while Goodrich-developed Darvan is expected to find broad use in knitwear. Arnel 60 will be used principally as a blending fiber; Darvan, 100% or in blends.

Commercial production of Arnel 60 at Celriver is scheduled for late '60. The fiber is said to be a much stronger version of Arnel triacetate. Aim: to extend Arnel's use into lighter-weight fabrics, enable it to compete with higher-priced man-made fibers.

Purchase of Darvan is Celanese's first move into wholly synthetic fibers —except for its $20-million joint venture with Imperial Chemical Industries to produce polyester fiber at Shelby, N.C. (*CW, Oct. 25, '58, p. 37*).

Under the transaction with Goodrich, Celanese acquires patents, trademark, technical know-how and world rights to produce and market the fiber; Goodrich retains rights outside the textile fibers field, including plastics applications.

Darvan staple is now being produced in a plant at Goodrich's development center in Avon Lake, O. Goodrich will continue to operate the plant until Celanese begins production. In the manufacture of Darvan, acetic acid is converted into vinylidene dinitrile, which is then copolymerized with vinyl acetate. Both acetic acid and vinyl acetate are produced by Celanese Corp.'s Chemical Division at Pampa, Tex.

Celanese says it has not yet determined which facilities will produce Darvan, and no date has been set for appearance of Darvan in consumer apparel lines.

Loading up at Sydney: Australia's exports spur chemical growth.

Boom Building Down Under

A host of new chemical projects highlight the chemical boom that is pacing economic growth in Australia. Some are drawing on British capital —e.g., the ethylene plant to be started at Clyde next month by Shell Chemical (London); others have American backing—e.g., the five-company petrochemical complex being built near Melbourne.

In the next few years, total foreign investments in Australia are expected to average about $300 million/year, with something like 35% of the total going into the chemical and petroleum industries. This will represent a considerably greater influx of capital than heretofore. During the past few years, foreign investments in Australia's chemical and petroleum industries have been in the $30-60-million/year range, and these industries have accounted for only about 20% of total foreign investments, which have averaged $220 million/year.

About 25% of Australia's total foreign investments come from the U.S. and Canada—a good chunk from U.S. chemical producers. Nearly every major U.S. chemical and pharmaceutical company has invested in Australia (notable exceptions: Du Pont and Allied). In fact, of the country's four biggest producers, two are subsidiaries of Union Carbide and Monsanto, although the largest of all is Imperial Chemical Industries of Australia and New Zealand, long-entrenched subsidiary of ICI (London).

In all, more than 200 U.S. firms have Australian subsidiaries, and more than 600 others have licensing or technological arrangements. A new burst of investment by European and Japanese producers is expected soon.

Long Leaps: The magnet for this stream of investment capital is Australia's phenomenal chemical growth. In the 12-year period 1946-58, the value of chemical output swelled 528%, to $278 million. Imports rose 449%, to $78.3 million. Between '39 and '58, the number of chemical plants increased from 250 to 493; and the number of people employed multiplied from 8,116 to 22,196.

This chemical growth has accompanied over-all economic growth, although as elsewhere chemicals are advancing somewhat faster than industry as a whole.

Some guideposts: Between mid-'52 and mid-'58, population growth averaged an annual rate of 2.4%—one of the highest rates in the Western world. The gain in national product averaged 7.6%; in per-capita income, 3%; in manufacturing, 8%. Since 1948-49, factory output has mounted by 70%.

Already, Australia is a sizable market. Population is small—10 million —but per-capita income is well over $1,000/year, significantly outranked only by the U.S. and Canada, and higher than that of countries such as West Germany, France and Italy. Moreover, Australians like to spend their income.

Still, in many lines, this is not a big enough market to support what a U.S.-conditioned producer would call an "economical" plant. What has made Australia's chemical growth possible is insulation from competition—the natural insulation of vast distances from most other industrialized countries, and the artificial insulation of the government's avowedly protective tariff policy. This protection, along with a moderate tax rate (lower than in the U.S. for publicly held companies), has made it possible for manufacturers to chalk up modest profits: in '58, an after-tax average of 5.5% on shareholders' funds.

Pushing Plastics: The hottest thing on Australia's chemical horizon right now is petrochemicals. The latest project is Shell Chemical's ethylene plant at Clyde, near Sydney. Construction will start soon, with the plant slated to go onstream in '62. Shell will pipe the ethylene 12½ miles to ICI's polyethylene plant—Australia's first—which went onstream in '57. ICI will expand the plant to a total capacity of 25,000 tons/year, switching over from ethanol.

The Shell-ICI venture will compete head-on with the polyethylene plant Union Carbide is building at Melbourne as part of a $50-million petrochemical complex (*CW, Feb. 14, '59, p. 24*). This will also include Standard-Vacuum's ethylene and butadiene plant, the Stanvac-Goodyear 30,000-tons/year SBR rubber plant, and the Dow-CSR Chemical 14,000-tons/year styrene monomer plant.

Another styrene plant will be built at Sydney by Monsanto and Petroleum and Chemicals Corp. Ltd. (Sydney). For this venture, they have formed a new company, Australian Petrochemicals Ltd., expect to have it onstream in '61.

And B. F. Goodrich Chemical Co. plans to "take care of all of the country's forecast needs" for vinyl with

a soon-to-be-built $4.5-million plant.

These projects will go a long way toward making Australia self-sufficient in plastics. Already, domestic producers supply all but 25% of the 32,000-tons/year consumption, are producing all important types except the high-density polyolefins, polycarbonates, and acetal resins.

Some producers, in fact, have been finding themselves with spare capacity on their hands. Demand has weakened for phenol-formaldehyde, melamine-formaldehyde, urea-formaldehyde, and polystyrene, although it has remained strong for polyvinyl chloride polymers and copolymers, and is soaring for polyethylene and polyesters.

Too Much? U.S. petrochemical ventures have been sprouting so fast that talk of overcapacity is now floating around Australian business circles. The combined output of the Dow and Monsanto styrene plants is expected to far exceed local demand, and is probably too expensive for export. There has been talk that a second synthetic rubber plant may be set up by local tire producers. If it is, it could help siphon off some of Monsanto's styrene, but it would also mean substantial overcapacity in synthetic rubber.

Monsanto's styrene outlook may brighten through sales of high-impact polystyrene (it put a new plant on-stream last year). But styrene's future could be thwarted by an invasion of high-density polyethylene or polypropylene—which ICI is reported to be considering producing.

Even polyethylene may be in oversupply for some time, despite its soaring market growth. ICI's plant alone will be able to meet projected demand until '65. And Union Carbide says its new plant will have an "initial capacity" of 7,500 tons/year. (Stanvac's ethylene plant will have a capacity of 20,000 tons.)

Good Deal for Drugs: While plastics producers are trapped within the home market by their high costs, pharmaceutical makers are finding Australia an attractive export base as well as a substantial home market. Total output of pharmaceutical and toilet preparations was valued at $90.7 million in the 1957-58 fiscal year. Exports of drugs and medicines alone totaled $4.3 million, with biggest sales to New Zealand, the U.S., New Guinea and southeast Asia countries.

A number of expansion projects are under way. U.S. companies increasing production facilities include Eli Lilly, Merck Sharp & Dohme, Pfizer, Sterling, Upjohn, and Warner-Lambert.

In general, Australia's chemical industry is already pretty well diversified; most products are made locally. There are a few important gaps that will probably be filled before long, including urea, tetraethyl lead, and high-density polyolefins.

But normal market growth and the development of new products will ensure continuing expansion. Paint production, for example, has been running at only 70% of capacity. But producers are spending $2.24 million this year to build facilities for new paint resins.

Australia is moving too fast to suddenly go stale, but it's no sure bet that the current spectacular growth rate will continue. Several problems are looming ahead. With increasing prosperity in Europe, Australian immigration—the major element in its population growth—has fallen off. So has economic growth over the past few years. In the next decade a shift in population trends is expected to result in the work force's growing faster than the total population, creating an employment problem.

To keep its industry growing fast enough to maintain full employment, Australia will have to boost its imports. These will have to be paid for by stepped-up exports.

The payments problem is complicated by Australia's reliance on the fickle world market for primary goods—half of Australia's exports is wool, and nonferrous metals and grains make up most of the remainder.

The government has launched a drive to boost exports of manufactured goods, particularly to Asia and Africa. But high costs are a major snag. Except for drugs, chemical producers don't expect a dramatic boost in sales abroad (now about $14 million/year). They are largely priced out of the market by high material, power, and especially transportation costs, and by underscaled plants which hike the cost of labor.

Some of these factors will ease: productivity is increasing; new hydroelectric and transportation expansion programs will also ease the cost squeeze.

Petrochemical exports may be spurred when the $60 million spent on oil exploration pays off. The discovery of a huge gas reservoir earlier this month near Melbourne has buoyed hopes considerably.

Likely, chemicals' major gain from any spurt in Australian exports will be indirect, as output of chemical-consuming industries increases.

If Australia's export and immigration incentive programs do succeed, full employment is maintained and the population growth sustained, manufacturing output could nearly double by '70—a trend that would spell still more expansion for chemicals.

Deeper into Drugs

Michigan Chemical Corp. (Saint Louis, Mich.) is striding firmly into the pharmaceutical business, just as President Ted Marvin foretold last summer (CW, Aug. 22, '59, p. 23).

While continuing to produce bromine compounds and other basic intermediates for pharmaceutical companies, Michigan is rapidly broadening its base in this field. Its current moves:

- Acquisition of Metropolitan Laboratories (Oyster Bay, N.Y.), a 25-year-old producer of parenteral formulations. This will give Michigan a line of about 100 ethical drugs—mostly injectable forms of vitamins, hormones and numerous other USP and National Formulary medications. Metropolitan's plant and sales force are to be taken on, too.
- Formation of an ethical pharmaceutical division, to be known as Pharmich Laboratories, to carry on all the corporation's pharmaceutical operations. Picked to head this new division: H. E. Mahony, who came to Michigan Chemical after 18 years with Merck.
- Expansion of pharmaceutical research facilities. This will include work on therapeutic specialties, as well as continuing work on development of new compounds for sale to other pharmaceutical concerns.

Also, Marvin adds, the company is considering "the early acquisition of additional facilities"—all aimed at boosting MC's earnings ratio, which for the first nine months of '59 was just shy of 6.5%.

CW PHOTO—JOAN SYDLOW

Century's Hodgins (center), Treasurer Healey, Vice-Pres. Brockman.

Goal: Century Growth Plan

Century Chemical Corp. (New York)—a $10-million/year business, which two years ago was an idea in the mind of founder Ted Hodgins—this week is driving to fill the one big gap in its operating plan: a proposed $4-million benzene-processing plant that would supply principal input requirements of its present chemical manufacturing units.

To speed this vertical integration, Century is: negotiating for processes to be used in the proposed plant; laying plans for a $1-2-million debenture offering; pushing development and sales of new products—e.g., two benzoate-based food preservatives. Object: to build up an earnings record that will warrant an additional $3-5-million public financing later on.

Progress, Projections: To help pave the way for future trips to the money market, Hodgins and other company officers held a press reception in New York's Barclay Hotel this week. They related considerable progress during the past seven months, revealed a plan for growth.

First and foremost on Century's agenda is the proposed plant to produce key organic compounds for its two recently acquired chemical manufacturing operations: Wilson Organic Chemicals (Sayreville, N.J.) and Chemo Puro Mfg. Co. (Newark). Nitrobenzene, various chlorinated derivatives, and a still unspecified dibasic acid figure into this operating plan.

The company figures it can produce these chemicals for less than it now costs to buy them; and that it will be able to market some of the output to other users in the highly industrialized Newark-New York area.

This plan permits maximum utilization of the company's Newark properties: barge and tanker loading facilities, a 4-million-gal. tank farm and manufacturing plants, all on a 12½-acre tract on the Passaic River (now 30-32 ft. deep but scheduled to be dredged to 35 ft.). The firm could buy benzene in large shipments, receive it directly from barges or tankers, and store it for use as needed—possibly at a rate of about 30 tons/day.

The Chemo Puro plant—its output accounted for about $4 million in sales last year—is already located on the Newark site; and the Wilson operation—with a business approaching $1 million/year—is slated to be moved to the Newark tract later on.

Asphalt with Additives: Also located on the Newark site is the recently acquired Asphalt Division of Oil & Chemical Products, Inc. This unit—which has supplied standard and improved asphalt for public works in New York, Delaware, New Jersey, Pennsylvania and Connecticut—specializes in upgrading asphalt by addition of epoxies, butadiene-styrene copolymers, and other resins. It's cooperating with two major rubber and chemical companies in further research in this field, according to Hodgins.

Other units acquired to date: a 12-man research and development section, which Hodgins intends to augment later this year with appointment of a research and development director and additional research scientists; and a 92% interest in Chemo Puro AG. (Zurich), which markets products made by Chemo Puro and others. It has branch offices in Amsterdam, Hamburg and Florence, is due to extend its marketing operations to other continents. New sales offices are ticketed for France, Latin America and Canada. Hodgins plans to give the Swiss firm the additional assignment of keeping Century informed on European technological and industrial developments.

Under present plans, Chemo Puro AG. will be the marketing arm of Century's newly formed International Division, which Hodgins figures will be an important factor in the company's total revenue-generating potential. He wants to acquire manufacturing plants in various countries, and to have International take charge of licensing activities abroad.

Since Century has been organized without any "big money" backing, it's natural that financing is a key problem. So far, about $350,000 has been invested in the company's stock, including the $260,000 that was raised in a public offering last June (*CW, July 11, '59, p. 27*).

Loans and advances brought in nearly $1.5 million additional cash, most of which was used to pay for the acquisitions. The proposed issue of debentures later this year would be to pay off a substantial part of the loans and to give the company more working capital.

The $3-5-million public offering being considered would finance construction of the benzene processing plant and possibly plant acquisitions in various countries.

Hodgins—long-time chemical researcher, executive and consultant—is keen on new products as sales and earnings boosters. He is setting up cost studies to determine profitability of present and prospective products. "The Chemo Puro plant," he tells CHEMICAL WEEK, "is very adaptable."

EXPANSION

Oxygen: Mingo Oxygen Co., a joint venture of Hydrocarbon Research Inc., and Wheeling Steel Corp., is building a $6-million oxygen-generating plant at Mingo Junction, O. The plant, on property leased from Wheeling Steel, will feed nearby Wheeling oxygen consumers. Completion is targeted for late '60. Initial capacity: 400 tons/day.

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Tires: Goodyear Tire & Rubber Co. (Akron) plans a $4-million earthmover-tire production expansion at Topeka, Kan. Largest tires; 10 ft. in diameter.

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Olefin Yarns: Dawbarn Bros. (Waynesboro, Va.) is expanding polypropylene fiber capacity. Its latest move adds 50,000 sq. ft. to manufacturing space, bringing the total to 160,000 sq. ft. The company also has acquired a 10-acre tract adjacent to the plant site.

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Photographic Films, Chemicals: Eastman Kodak Co. (Rochester, N.Y.) this year will invest $67 million in capital projects—$6 million more than the company's capital expenditures in '59. About $32 million is budgeted for Rochester facilities, $29 million for Kingsport, Tenn. Included: substantial sums for Texas Eastman's polypropylene plant and for Tennessee Eastman's Kodel polyester fiber plant

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Aluminum Fluoride: Stauffer Chemical Co. (New York) will expand its Nyotex Division's aluminum fluoride plant at Houston, Tex. The expansion, scheduled for March '60 completion, will double capacity of Stauffer's aluminum fluoride made by the fluidized-bed process. The first fluidized-bed unit was installed at the plant in early '58.

COMPANIES

Consolidated Paper Corp. (Montreal) is purchasing from St. Regis Paper Co. (New York) all of St. Regis's multiwall bag and packaging-system manufacturing facilities in Canada. Terms: $1.6 million in cash and 785,000 shares of Consolidated's stock, bringing total number of shares outstanding to 5,917,762. Consolidated proposes to incorporate a new company, St. Regis-Consolidated Packaging Ltd., to carry on manufacturing operations in Vancouver, B.C., Dryden, Ont., St. Lambert and Cap de la Madeleine, Que.

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Monsanto Chemical Co.'s Plastics Division will shift its headquarters from Springfield, Mass., to the company's executive offices at Creve Coeur, Mo. (near St. Louis), by June '61.

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Thiokol Chemical Corp. (Bristol, Pa.) will transfer its rocket activity headquarters to either Salt Lake City or Ogden, Utah. This will put H. W. Ritchey, vice-president in charge of rocket operations, close to the company's research and development unit and the newly organized Utah Production Division. The latter will carry out Thiokol's contract on the Minuteman ballistic missile. Ritchey also will have charge of Thiokol's Redstone and Longhorn divisions, located at Huntsville, Ala., and Marshall, Tex., respectively.

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Bristol Laboratories, Inc. (Syracuse, N.Y.), has been merged into parent company Bristol-Myers Co. (New York), will operate as a division of the latter.

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Synkoloid Co. (Los Angeles) has acquired Gelvatex Coatings (Anaheim, Calif.), including all equipment and research facilities. Gelvatex—maker of polyvinyl acetate paints—was a division of Shawinigan Resins Corp. (Springfield, Mass.). Synkoloid produces water-base emulsion paints.

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Sure-Seal Corp. (North Salt Lake, Utah) is reorganizing, will henceforth do business under the name of Petroflex Corp. Its line: refined wax products.

FOREIGN

Chlorine, Caustic Soda/Netherlands: Royal Netherlands Salt Industry plans to start up a new electrolysis plant near Rotterdam in early '60. Chlorine output (30,000 tons/year) will go to Royal Dutch Shell's nearby chemical plant.

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Fluorspar/South Africa: Buffalo Fluorspar Mine plans to expand its South African acid-grade fluorspar plant, which was recently started up. Current yield: 400-450 tons/month.

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Thorium, Uranium Salts/Egypt: The government-controlled Egyptian Black Sands Co. is seeking U.S. technical aid for a plant to separate thorium and uranium salts from monazite sands.

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Polyvinyl Chloride/Spain: The recently formed Mavi-Plas Industrial company is seeking U.S. equipment and technology to help set up a polyvinyl chloride plant.

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Modernization/West Germany: Badische Anilin- & Soda-Fabrik plans to invest at least $240 million during the next three years in plant and laboratories.

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Chemicals/Japan: Reflecting Japan's chemical export drive: Shoji Kaisha, of the Mitsubishi group, has named Quinonez Hermanos, S.A., exclusive distributor of its products, including chemicals, in El Salvador.

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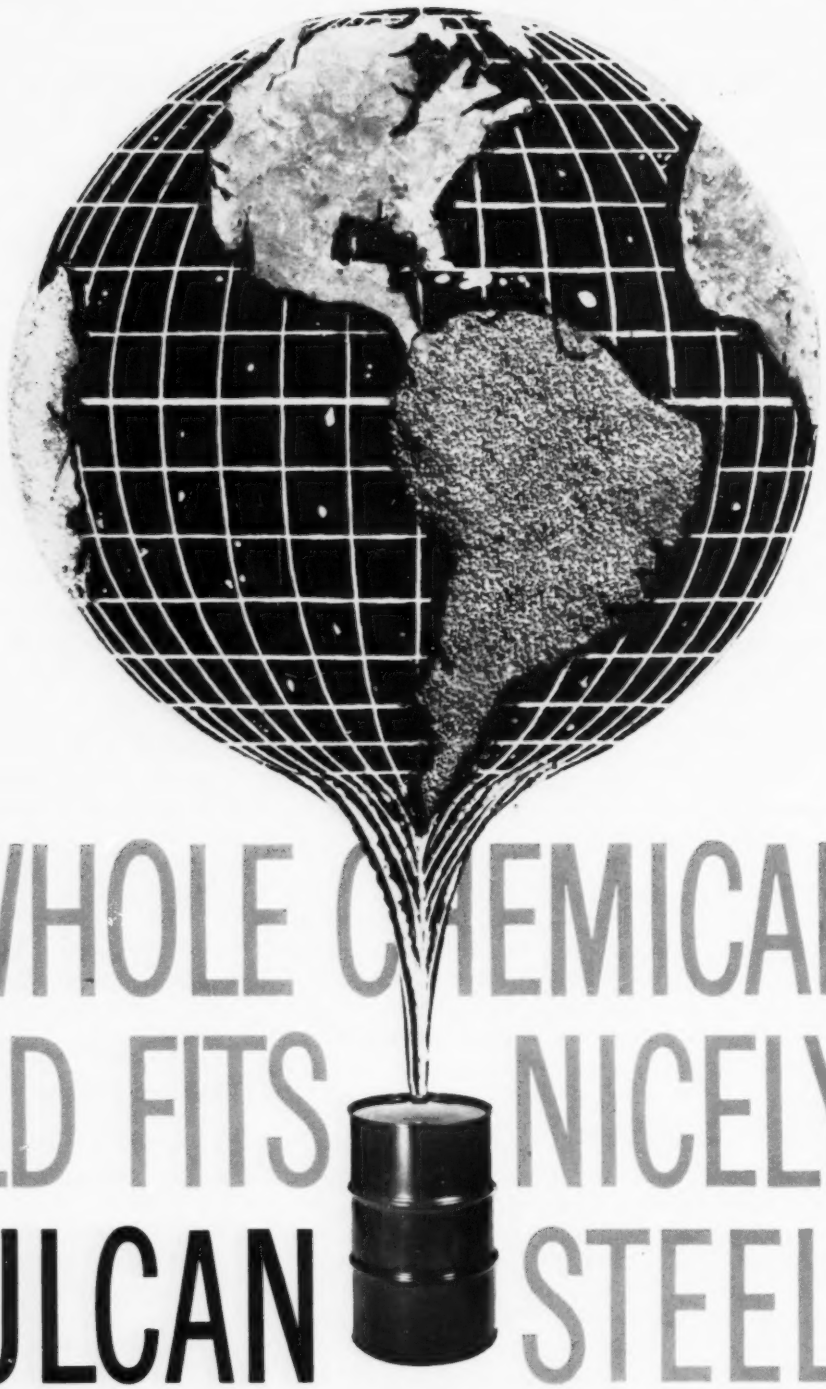
Carbon Black/Bolivia: Bolivian Oil Co. is reportedly planning to put up a $3-million, 8,000-tons/year carbon black plant using locally produced gas. The project is up for approval by the state petroleum agency.



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Washington
Newsletter

CHEMICAL WEEK
January 16, 1960

Speedier transition from missile R&D to production will mark the Pentagon's missile program this year. In addition, projects in the early stages of production will be pushed into heavier output schedules.

For makers of propellents, special structural materials, pressurants, lubricants, control elements, and other chemical suppliers to the missile industry, the outlook is for a big upsurge in procurement.

If you use the widely accepted yardstick that the chemical industry receives about 25% of the missile dollar, the total shipments of missile chemical products comes to $1.3 billion this year. That's at least $300 million more than last year's volume of business.

But the swing to solid-propellent rockets won't be as fast as many experts have expected. The big missile production money will still be earmarked for liquid-fueled weapon systems.

Production plans for both the Atlas and Titan liquid-propellent ICBM's, for instance, are being hiked about 35%. It's said that 270 of the ICBM's (both types) will be operationally deployed over the next few years.

Titan, a two-stage missile powered by an Aerojet-General propulsion system, reportedly now rates the bigger chunk of this production. But there could be a change. The project has been plagued by technical bugs; and Martin, the prime contractor for the missile, has been charged with management bungles by Pentagon top officers. The Air Force has forced the company to overhaul Titan management. The threat of cuts in the program still stands.

The Army's Nike Zeus anti-ICBM missile, a major solid-propellent rocket effort, will once more be returned to the research lab. The Army has been pushing for a green light on production of subsystems and components. Thiokol and Grand Central Rocket are the project's propulsion contractors. Nike Zeus is a three-stage, solid-fuel rocket with a booster producing about 450,000 lbs. of thrust at launch—probably the biggest solid-propellent engine now in the hardware stage.

Work will be stepped up on other solid-fuel missiles:

Production of air-to-air missiles—the Thiokol-powered Air Force Falcon and the Navy's Sidewinder and Sparrow III—will stay in high gear. Aerojet-General makes the engine for the latter, the Naval Powder Factory (at Indian Head, Md., near Washington) provides the power plant for the former.

The Navy's Subroc antisubmarine missile (produced by Thiokol) will be pushed faster.

So will the Army's Pershing surface-to-surface field missile

(also Thiokol), and the Air Force's Minuteman ICBM (Thiokol, Aerojet-General, and Hercules are propulsion contractors). These two are still in the R&D phase.

The biggest manufacturing drive will be ordered for the Navy's Polaris fleet ballistic missile. Aerojet-General makes the engines. Another big manufacturing effort is planned for the Navy's Bullpup air-to-surface missile, another Aerojet-powered weapon.

Among the missiles phasing out of production: The Army's Nike Hercules antiaircraft missile (Thiokol) and the Air Force's Thor and Jupiter IRBM's (both powered by Rocketdyne engines).

Rocketdyne, however, holds the big hand in NASA's super-booster program. It's also the propulsion contractor, of course, for the Atlas ICBM. The company's NASA Saturn and F-1 projects to build 1.5-million-lb.-thrust liquid-propellent boosters will be accelerated.

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Coal-tar color makers have won a reprieve that will let them try to get a new law passed by Congress.

The Food & Drug Administration has postponed action on colors used in both foods and lipsticks. On food colors, while the agency turned down the request from the manufacturers and some users for a hearing on its last October proposal to withdraw certificates of approval on batches already approved for sale, it gave the industry until April 6 to go to court for a ruling on whether it has authority to decertify batches once they have been certified as safe.

Batches approved prior to decertification were allowed to be used—and inventories may be running out. The colors involved:—FD&C Orange Nos. 1 and 2; FD&C Red No. 32; FD&C Yellows Nos. 1, 3 and 4; and all batches of FD&C Red No. 1 that do not comply with specifications laid down last July.

Makers and users of 17 lipstick colors also got a postponement out of FDA. Commissioner George Larrick last October set Jan. 6 as the deadline for certifying new batches of the colors. Next step would have been for Larrick to set a date after which none of the color could be legally moved into interstate commerce.

But FDA has now extended this deadline to Jan. 25. This means that batches of the colors can continue to be approved for use and sold.

It also means that Congress will be given a chance to show how quickly it is prepared to act on the color bill, which would permit FDA to fix tolerances for colors. A bill has been passed by the Senate permitting FDA to do this.

Chances are that the House will pass this, but will add on the Delaney amendment that will not permit tolerances for any carcinogens. Tests have not shown certified colors carcinogenic.

News from
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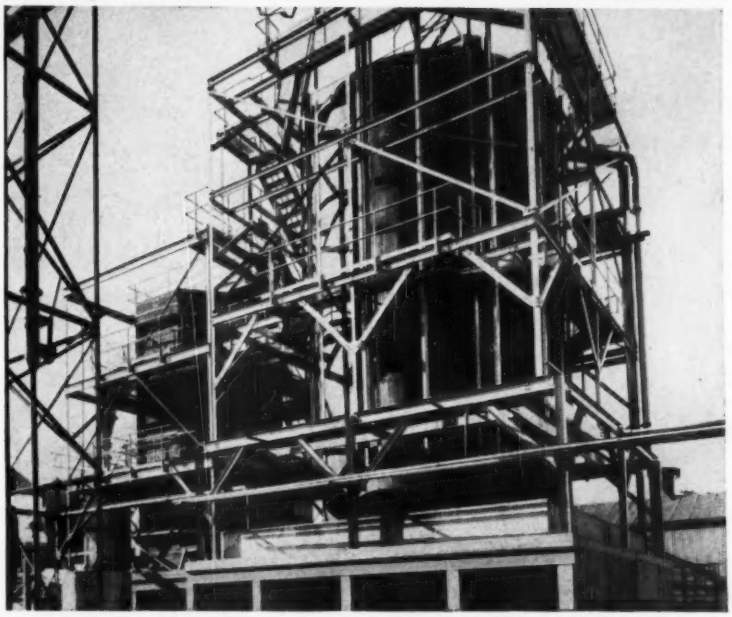
Manager, Process Equipment Sales

J. F. Revilock

Mr. Revilock was graduated from Case Institute of Technology with a B.S. in Chemical Engineering. For two years he worked at a mid-west research center, designing and installing chemical process equipment for pilot plant production of special aircraft fuels and lubricants.

Mr. Revilock joined National Carbon Company in 1944. For three years he worked in the Sales Department Development Laboratory designing and testing new "Karbate" impervious graphite products and improving existing equipment. For the past eleven years, he has been actively engaged in the design, construction, installation and process application of carbon, graphite and "Karbate" impervious graphite equipment. In 1954, he was appointed Manager of Process Equipment Sales, Chemical Products Marketing.

NATIONAL CARBON Makes the World's Largest Diameter Graphite Combustion Chamber



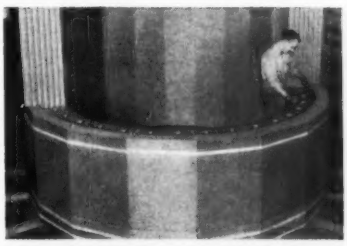
World's largest diameter graphite combustion chamber and a carbon hydrator tower will produce phosphoric acid from elemental phosphorus for The American Agricultural Chemical Company at their Carteret, New Jersey plant.

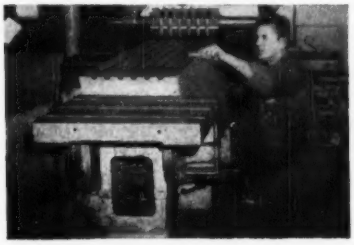
The graphite combustion chamber shown above – the largest in diameter ever installed–is being built with precisely machined graphite parts from National Carbon Company. It is 37'-3" high with an inside diameter of 20'-4". Phosphorus burned with air within the chamber is subsequently hydrated in the carbon tower shown at the left to produce phosphoric acid. This carbon hydrator is also the largest NATIONAL CARBON has ever built.

NATIONAL CARBON's graphite and carbon materials are well suited to this application because they provide corrosion-resistance and structural stability at elevated temperatures combined with ready machineability and moderate costs.

NATIONAL CARBON Has Facilities for Precise Machining of Large Structures

Photos show close tolerance machining of a wall block and factory preassembly of a block type graphite vessel for high temperature chlorination. Machining was done on new moving-bed horizontal milling equipment to tolerances of ± .010". The entire unit was pre-assembled in the plant with .010" thick shims to simulate cement joints to be made in the final installation. Men with years of experience in machining carbon and graphite working with modern equipment make this close tolerance work possible.





Working closely with NATIONAL CARBON's production staff are sales and technical service engineers with the industry's most extensive know-how in the design of carbon and graphite equipment for high temperature service. This combination of process knowledge and production experience makes National Carbon Company the leading supplier of graphite and carbon products used in the chemical process industries.

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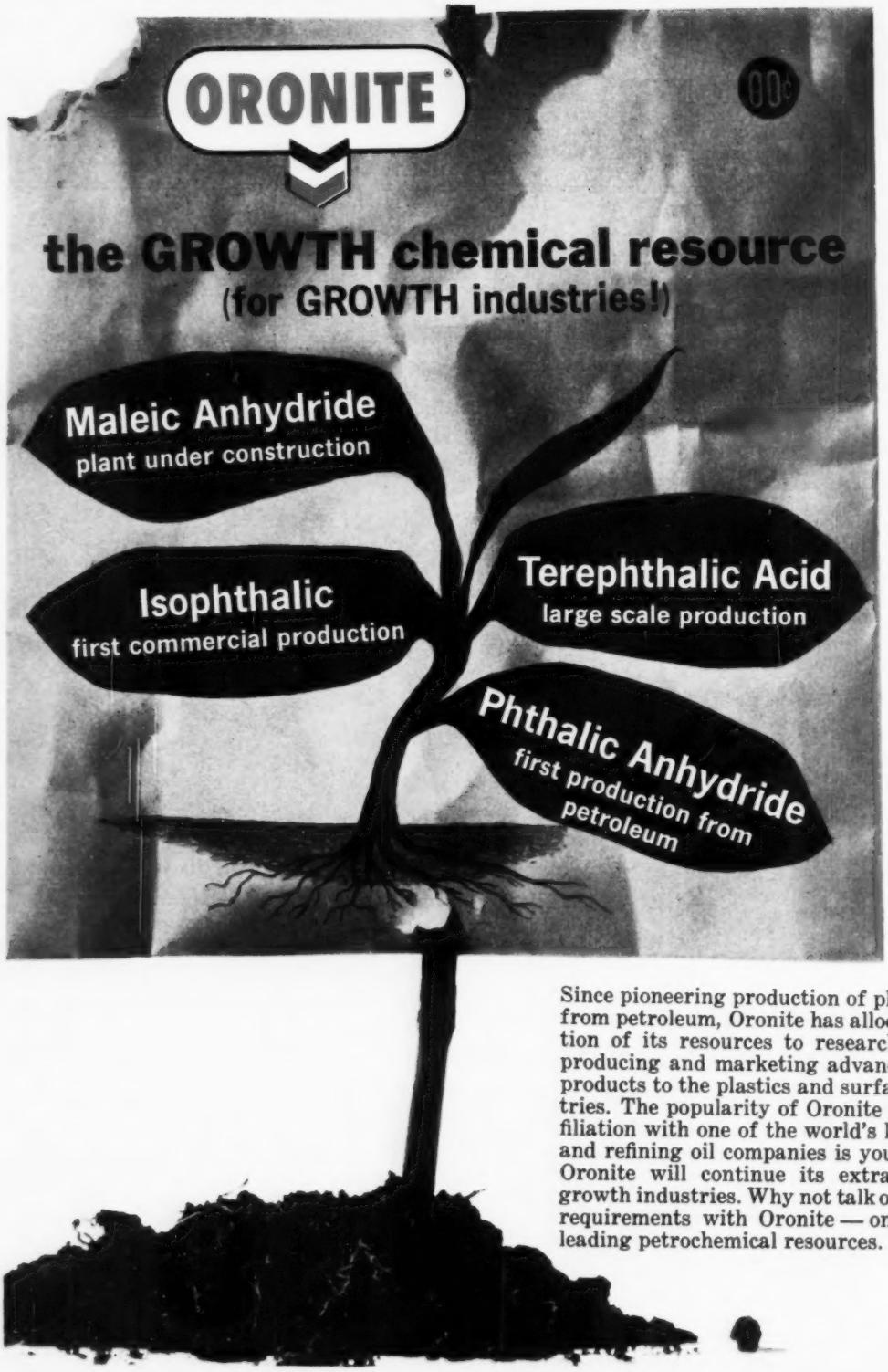

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Minimum Hourly Wages Under CPI Contracts with the Government

Branch of industry	*Last determination*	*Minimum rate*	*States included*	*Status*
Industrial and refined basic chemical products	Oct. 7, '56	$1.00	Ala., Ark., D.C., Ga., Fla., Md., Miss., N.C., S.C., Tenn., Va.	New determination hearings start Jan. 26
	Jan. 23, '51	$1.15	All other states	"
Drugs and medicines	Sept. 1, '58	$1.20	Industrywide	Raised from $1
Fertilizers	Oct. 7, '56	$1.00	Industrywide	
Fireworks	Oct. 7, '56	$1.00	Industrywide	
Paint and varnish	July 24, '58	$1.50	Industrywide	Raised approximately 50%, and regional differentials removed
Soaps and detergents	Dec. 8, '58	$1.50	Industrywide	Raised from $1
Pulp and paper products except paper bags	Dec. 5, '55	$1.15	Industrywide	Hearings expected March 8, '60; proposed minimum, $1.63
Paper bags	Dec. 7, '56	$1.00	Industrywide	Hearings recently held; no new determination yet
Photographic and blueprinting supplies and equipment	May 7, '56	$1.18	Industrywide	Hearings due in Feb. '60
Cleaning and polishing preparations, insecticides and fungicides	Oct. 7, '56	$1.00	Industrywide	New proceedings due in fiscal '61
Bone black, carbon black and lamp black	Jan. 23, '51	$1.40	Industrywide	
Blasting and detonating caps	April 20, '52	$1.12	Industrywide	

Outlook: New and Higher CPI Wage Floors

Coming up for review in two weeks will be minimum wage rates for workers in chemical plants filling U.S. government contracts for more than $10,000. The hearings will likely force substantial hikes of minimum wages, at the same time level out the existing geographical wage differentials for plants dealing with the government. And they will tend to push other CPI firms — even those without government contracts — to the same minimums.

The two major questions that industry, labor and government experts will argue in the hearings, which get under way Jan. 26 before a Labor Dept. examiner:

- What is the prevailing wage in the industry that shall be accepted as a minimum wage under government contracts?
- Should there be geographical differentials?

Under the Walsh-Healey Public Contracts Act, a firm with a government contract for more than $10,000 must pay employees the prevailing wage in the industry, as determined by the Labor Dept. The current minimums of $1 in 10 Southern states and $1.15 elsewhere are considerably out of date, having been set in '56 and '51, respectively (*see table*).

The hearings this month are limited to firms making "basic industrial inorganic and organic chemicals," including alkalis and chlorine, industrial gases, inorganic salts, inorganic compounds, basic plastic materials, dyes, acids, solvents, polyhydric alcohols, flavoring materials, rubber processing chemicals and plasticizers. Other types are due for consideration under separate hearings at a later date (*table*).

Influence and Fears: The amount of chemical business done under government contract is small—only

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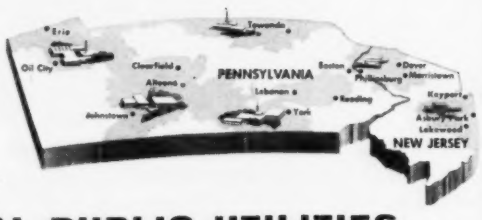
Pennsylvania Electric Co.
New Jersey Power & Light Co.
Jersey Central Power & Light Co.



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about $28 million/year out of $8-10 billion in the categories listed above. But the influence of the Walsh-Healey standards is greater than their direct impact.

For example, if one firm in a community is paying Walsh-Healey rates because it has a government contract, a competing firm may well be forced to meet the same wage level. Moreover, if a government-contract plant hikes wages of unskilled labor, it must accordingly raise wages of skilled labor to maintain grade differentials.

How many companies would have to raise wages if new rates are set—they would go into effect about mid-year—is problematical. It would depend on how high the rates were set.

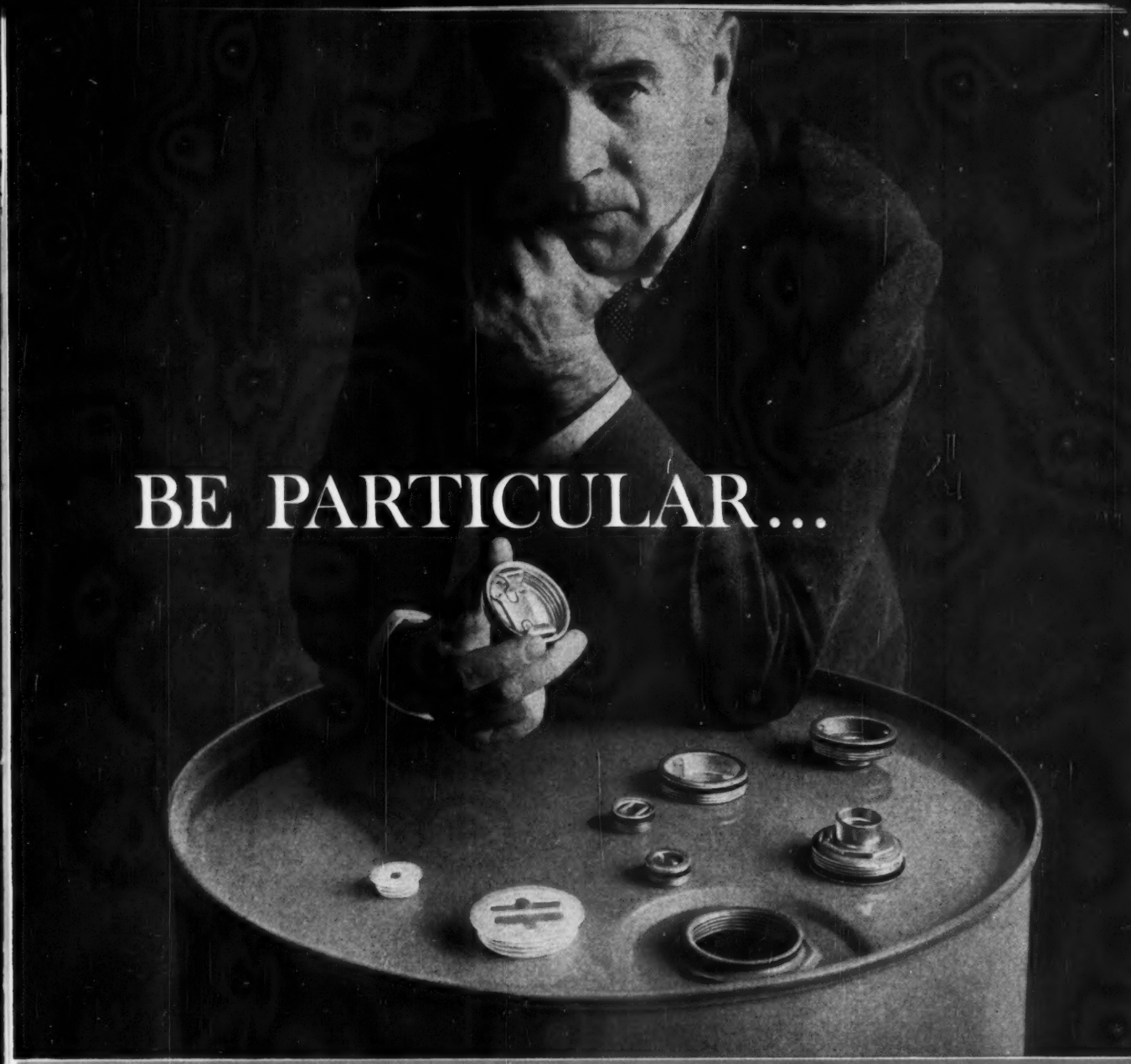
The number of plants that are now paying less than the prevailing wage has not yet been revealed by industry representatives who have been surveying the situation.

A study by the Bureau of Labor Statistics shows that only 10 of the nation's 718 firms affected by Walsh-Healey are now paying less than the $1.15 legal minimum. Industry spokesmen say there is, however, considerable spread in rates, particularly between regions. A plant, therefore, with a lower regional rate might have to hike wages considerably to meet an industrywide determination. Industry will fight hard to retain the differential for the South and perhaps to establish new differentials for other areas.

Some industry economists fear the new chemical minimum wage might be increased 65-85¢/hour—bringing the minimum as high as $1.80 to $2.

It's not likely that an increase would be that high, but trends point to a substantial one. The evaporated milk industry minimum was recently raised from $1 to $1.68 under the Walsh-Healey Act; flour milling was set (for the first time) at $1.30; and soapmaking was raised a year ago from $1 to $1.50. Moreover, average hourly wages have risen from $1.80 to $2.71—a 50% increase—for industrial inorganics workers and from $1.76 to $2.54—a 42% increase—for organic chemicals employees since '51.

Testimony: Witnesses expected to appear at the hearing include representatives of Manufacturing Chemists' Assn., several companies, International Chemical Workers Union, Oil, Chemi-



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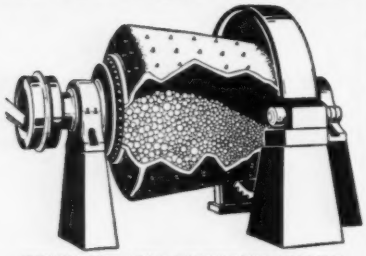

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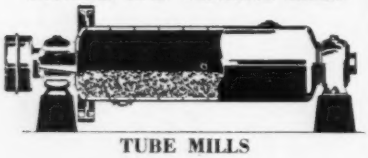

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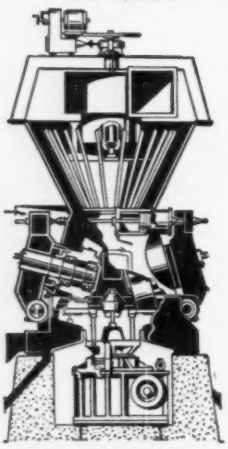

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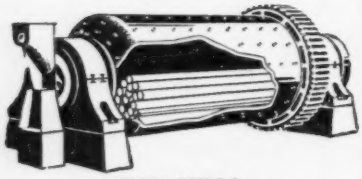

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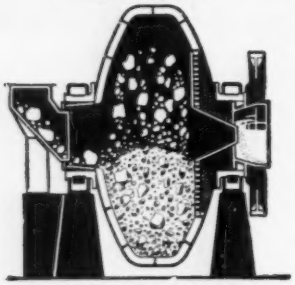

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cal & Atomic Workers Union, and statisticians and economists from the Labor Dept.

As the industry's major chemical unions, ICWU and OCAW will make a joint statement through an OCAW research department member. Although union representatives aren't saying what they'll recommend as a minimum, sources close to the unions indicate it might be around $1.75.

The wage level, however, is not a point of deep concern to the unions. A check of OCAW contracts, for example, reveals that "only a handful" of union members receive less than $1.50/hour—and most of those are handicapped workers employed in small plants. The wage level interests the chemical unions mainly because it provides a floor under wages and a standard by which they can measure their bargaining positions.

What the unions would most like to get out of the new determinations is an industrywide minimum. It's basic to their philosophy that workers performing a certain type of work should be paid uniformly, no matter where they work. Moreover, a uniform wage structure would smooth the road toward industrywide or multiplant bargaining, another union goal.

Management will aim to maintain geographic differentials on the grounds that wages are a matter of prevailing circumstances at a given location, are based on living costs and competitive conditions in that area.

How successful the management spokesmen will be is a guess. Ninety per cent of the minimum rates set for various industries are already on a national, not regional, basis, so that a plant in a low-wage area cannot underbid other plants for contracts on the basis of lower labor costs.

Industries that sell their products largely in the region where they are made are most likely to be allowed regional differentials. Chemicals, on the other hand, are shipped all over the country. Labor Dept. officials say that a lower wage rate may not necessarily be allowed for the South because it was allowed in '51. In the most recent case in the chemical process industries, paint and varnish minimum wages were put on an industrywide basis in '58.

Other Determinations: Elsewhere in the chemical process industries, other new wage hearings are coming up. Although not officially scheduled, pulp and paper makers will air their views in March, and photographic and blueprinting supply makers will be heard in February. New proceedings are due in '61 for makers of cleaning and polishing preparations, insecticides and fungicides.

It's the cumulative effect of wage hikes in many industries that has put real pressure on management. A CHEMICAL WEEK check in major chemical producing areas indicates that rises in minimums in other industrial categories usually mean increased raw-material or service prices, adding to the chemical makers' manufacturing costs.

Outlook: The hearings are expected to take about three days. Two or three months later, the government will issue its proposed minimum wage, and participants then will have 30 days to object. After a determination is issued about midyear, it will be appealable only through the courts.

Industry expectations were summed up this way by an executive of one large chemical company: "You can bet your boots we'll get an increase—how much, I'd hate to speculate."

Trouble in Packages

Producers and users of packaging materials have asked the government for a special one-year extension of the March 5, '60, deadline for proving the safety of their products, when used to wrap food. If the extension is not granted by the Food & Drug Administration, the industry faces a hectic scramble for substitutes when the deadline hits.

The food additives amendment enacted in '58 aims to control the rapid increase in the number of chemicals used to preserve or process food. But the packagers come under the act, since some kinds of wrappings and containers contain ingredients that migrate into the food.

Packagers are harder hit than other segments of the food industry, because "food additives" is a new field to them. Until now, they could use any material they considered safe, until FDA proved it unsafe. Now the burden of proving safety is on the packagers. Upshot: they'll either furnish proof themselves—an expensive process—or they'll buy only ma-

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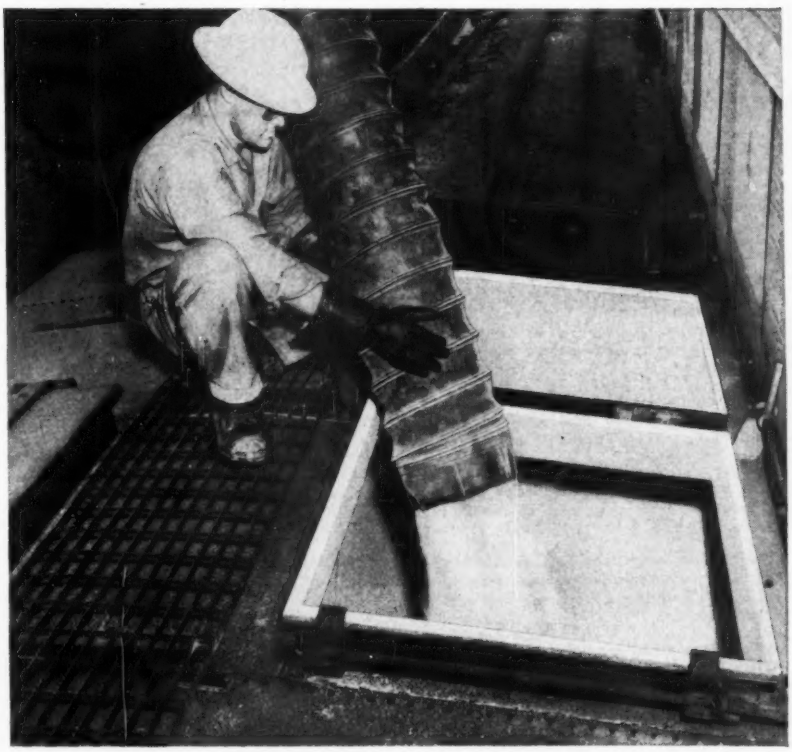

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ADMINISTRATION

terials and chemicals that have already been tested by their producers.

Blanket extension of the deadline seems unlikely. However, Health, Education & Welfare Secy. Arthur Flemming has assured packagers that companies moving rapidly to comply will be given every consideration. But government officials privately feel that some firms have been moving too slowly, have tried to "shove the problem under the rug." Special allowances are not likely for the latter group.

LEGAL

Antitrust Cases: Two antitrust cases directed against CPI firms are in the news this week. One, a civil antitrust suit against Pittsburgh Plate Glass Co. and six other manufacturers of plate glass mirrors, has been terminated by the entry of a consent judgment, according to the Justice Dept. Details of the decree have not been revealed.

In the other case, preliminary inquiries are under way by the federal government and New York state to determine if there is evidence of price fixing by manufacturers supplying chemicals to the city of Binghamton. Mayor J. J. Burns had written the state attorney general concerning his city's effort to buy liquid chlorine through sealed competitive bids. "For years," the mayor says, "each bidder has submitted a bid calling for the same price as those of other bidders." Action is now awaiting submission of evidence.

•

Pollution Precedent: What may be the first injunction suit based on charges of air pollution against a Florida phosphate producer has been filed. T. M. Mathers and his wife, of Bartow, Fla., charge that the Virginia-Carolina Chemical Corp. plant there has been discharging "large amounts of dust, gases and fumes, the odor of which is irritating . . . when mixed with the surrounding air. . . ." They also claim that the company has "ignored" their complaints and that the Florida Air Pollution Control Commission "cannot or will not help" correct the condition. The Mathers claim indicates the alleged discharge began after they moved into their Bartow home.

Taiwan Test: Hydrocarbon Research, Inc. (New York) has denied charges brought against it by Taiwan Fertilizer Co. (Formosa), which has claimed dissatisfaction with the contract it had with Hydrocarbon for construction of an ammonia plant in Taipeh. In its answer filed in U.S. district court at Trenton, N.J., Hydrocarbon said that Taiwan Fertilizer had, by its conduct, reaffirmed the agreement, acted under its terms, and had accepted Hydrocarbon's performance under the contract.

Hydrocarbon contends that Taiwan's allegations are insufficient to constitute a cause of action, are alleged simply as subterfuge in an attempt to deprive Hydrocarbon of its rights under the agreement.

LABOR

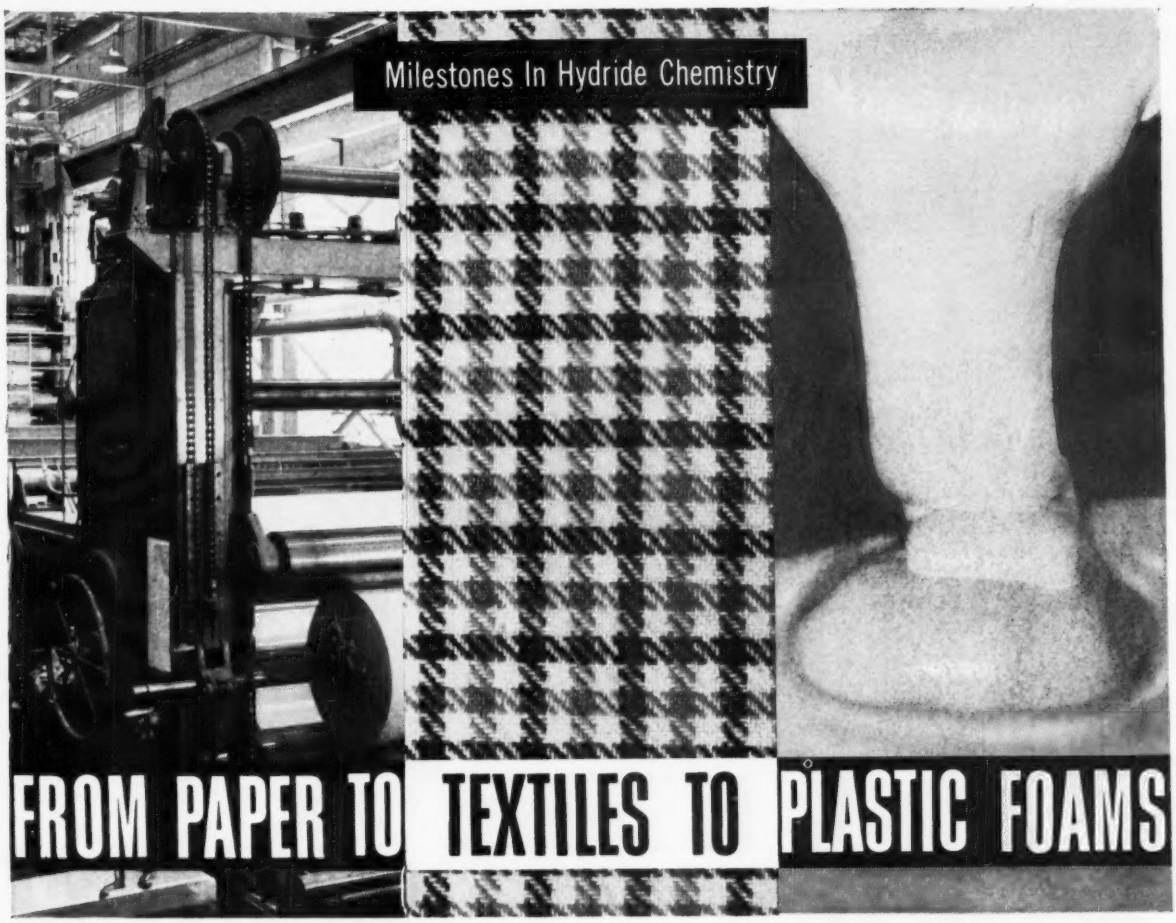
Charges Dismissed: Charges of unfair labor practices brought against Virginia-Carolina Chemical Corp. by Local 36, International Chemical Workers Union, have been dismissed by the National Labor Relations Board. In its charges, which grew out of a lengthy strike last summer, the union contended that V-C refused to rehire some workers and to negotiate in good faith at a bargaining session. Employees have been working at the plant without a contract for several months, and negotiating sessions are still under way.

•

Vote No Union: Employees of Susquehanna-Western Corp.'s uranium mill at Riverton, Wyo., have voted against affiliating with any union. The vote, conducted under National Labor Relations Board supervision, showed 23 votes for District 50, United Mine Workers, seven for Oil, Chemical & Atomic Workers, and 44 for no union. Under NLRB regulations, the unions cannot try to organize the company for another year.

•

No Progress: At the Sugar Creek, Mo., refinery of Standard Oil of Indiana, negotiations between management and Oil, Chemical & Atomic Workers are still stalemated. The plant has been struck for more than six months. Management has reported that the plant is being operated at 70% of capacity by supervisory workers.



New Processing Applications for Borohydrides

In league with chemical processors around the world, MHI continues full tilt on the development of new applications for hydride chemistry. Application development for sodium and potassium borohydrides, for example, has opened exciting possibilities for chemists working in the pulp, paper, textile and plastic foam fields.

Reductive wood pulp bleaching

Sodium borohydride and potassium borohydride are being used effectively as reductive bleaching agents for wood pulp and cellulosic textile materials and for stabilizing bleached materials to prevent color reversion or yellowing. For the first time, chemists now have a water soluble reagent which will selectively and quantitively reduce the aldehyde groups in oxidized cellulose.

Textile finishers "clean up"

The borohydrides quantitively and rapidly reduce aldehydes and ketones to alcohols in water or alcoholic solutions at room temperature and atmosphere. The borohydrides "clean up" trace amounts of residual aldehydes in organic products, preventing odor development and greatly improving color stability for finishes using aldehyde-based resins. Borohydrides also reduce the carbonyl group in cellulose, introduced by oxidative bleaching, thus increasing resistance of the fibers to hot alkali.

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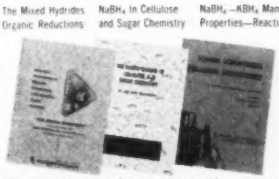
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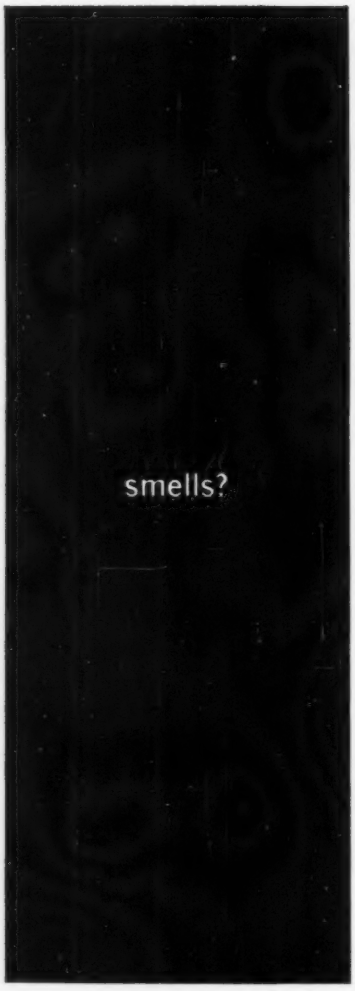

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ADMINISTRATION

KEY CHANGES

George G. Stier to president and **Harry A. Batley** to executive vice-president, Nopco Chemical Co. (Newark, N.J.).

Bruce Ainsworth to president, Harchem Division, Wallace & Tiernan Inc. (Belleville, N.J.).

K. H. Shaffer to chairman, board of directors, and **J. E. Gosline** to president, Standard Oil Co. of Texas, subsidiary of Standard Oil Co. of California (San Francisco).

Richard J. Hefler to board of directors, American Potash & Chemical Corp. (Los Angeles).

Howard G. Oster to board of directors, Eaton Chemical and Dyestuff Co. (Detroit).

John S. Sprowls to board of directors, Vickers Petroleum Co., Inc. (Wichita, Kan.).

Sol M. Linowitz to board of directors, Haloid Xerox, Inc. (Rochester, N.Y.).

David X. Klein to divisional vice-president, Heyden Newport Chemical Corp. (New York).

Harold W. Ritchey to vice-president in charge of Rocket Divisions, Thiokol Chemical Corp. (Trenton).

C. J. Schmidt to corporation vice-president, Midland-Ross Corp. (New York).

John F. Claydon to vice-president, Carborundum Co. (Niagara Falls, N.Y.).

William F. May and **Clarence L. Van Schaick** to board of directors, American Can Co. (New York).

Wilbur H. Brumfield to president, Solvay Process Division; **Frank J. French** to president, General Chemical Division; **Frank M. Norton** to executive vice-president, Plastics and Coal Chemicals Division; all of Allied Chemical Corp. (New York).

DIED

John G. Bill, 55, president, Merck Sharp & Dohme Division, Merck & Co., at Philadelphia.

George A. Rasch, 58, president, Riverside Chemical Corp., at Buffalo.

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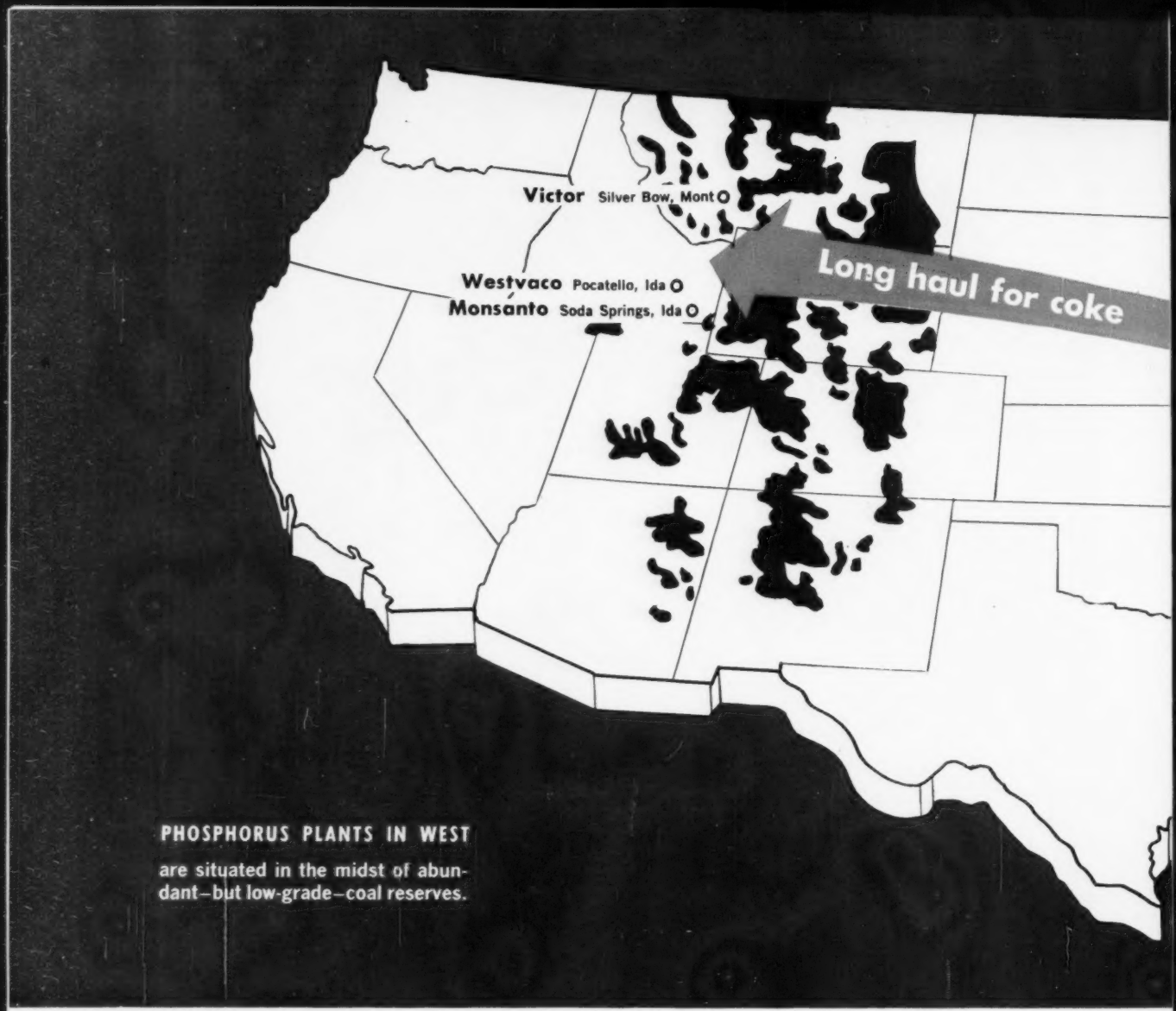

PHOSPHORUS PLANTS IN WEST

are situated in the midst of abundant–but low-grade–coal reserves.

New Coking Methods Shorten

Plans are moving ahead this week on new coking processes designed to produce coke from the abundant low-grade coal reserves in the mineral-rich Utah-Wyoming Intermountain area. Elemental phosphorus plants there, which require more than 1¼ tons of coke per ton of phosphorus, are primary targets of the new coking techniques; coke-hungry blast furnaces are a close second.

Food Machinery and Chemical Corp. recently disclosed plans for a $3.5-million coking plant at Kemmerer, Wyo. (*CW, Jan. 9, p. 26*). It will manufacture metallurgical-grade coke for phosphorus operations at its Westvaco Mineral Products Division (Pocatello, Ida.). And U.S. Fuel Co. (Salt Lake City subsidiary of U.S. Smelting, Refining & Mining Co.) last week revealed details of a successful pilot-plant operation yielding high-quality coke pellets and coal-chemical by-products from Utah coals.

Mineral processors in the Intermountain area have long sought to exploit their vast local coal reserves —estimated to represent more than half of the nation's total reserves. Most of the coal in this area, however, is lignite (brown coal) and subbituminous material unsuited to conventional coking techniques. Result: many of the large carbon-consuming process plants have had to depend largely on coke hauled 1,500 miles from Kentucky and West Virginia. The potential savings on shipping costs alone provides strong incentive for the development of suitable carbonizing processes.

FMC's Pocatello plant obtains a small amount of coke from U.S. Steel's coking facilities at Geneva, Utah, but Eastern coke makes up the bulk of its supply. Monsanto uses coke from Western sources for its phosphate operations at Soda Springs, Ida., has expressed interest in the potential cost savings that a nearby source would afford. Victor Chemical, too, would be a likely customer for Intermountain coke, now supplies its

COKE MADE IN EAST must now be shipped across country to charge Intermountain area phosphorus furnaces.

West's Raw Material Supply Lines

Silver Bow, Mont., phosphorus plant from sources in Western and Midwestern areas.

Coke Without Chemicals: Details of FMC's process are still a closely guarded secret, probably won't be made public until the Kemmerer plant is in operation. All that's known about the project: it's essentially a two-step process, does not produce coal-chemical by-products commonly associated with coking operations.

Coke production reportedly will consist of reduction of raw coal by gases of coal combustion in a retort or preheat chamber to yield a friable semicoke. This will be followed by mechanical briquetting without the use of binders, then final reduction to coke in another reducing unit. Natural gas will be burned only for startup.

Coke produced for Westvaco's phosphorus plant will likely be made in small briquettes, about ⅞-in. size. However, FMC expects to be able to produce larger coke—up to 3-in. sizes—suitable for blast furnace applications.

Although many carbon producers maintain that some coking costs must be borne by by-products to make metallurgical-grade coke competitive, FMC considers the lack of by-product operations a virtue of its process. Final proof of this economic theory, as well as the technical feasibility of the new coking technique, will be decided by the Kemmerer plant.

Thermal Decomposition: The process developed by U.S. Fuel's research director, Loran Creglow, has passed the critical pilot stage, is now termed both technically and economically feasible by the company. Key: thermal decomposition of natural gas within the coking chamber to supply auxiliary carbon while the high volatile content of the low-grade coal is being driven off. Here's how pilot tests were run:

Soft coal fines from U.S. Fuel's Hiawatha properties in central Utah (Carbon and Emery counties) were

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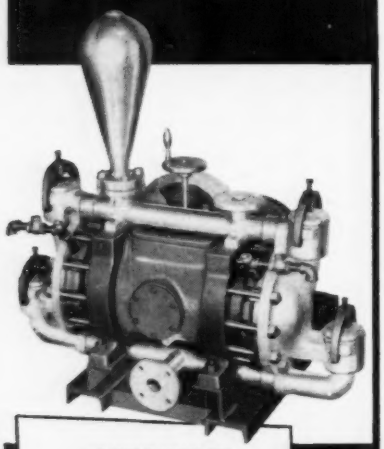

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first pelletized with water (23%) and an inert binder (2%) in a revolving drum. After screening to size, the pellets were dried by waste heat from the coking unit to a water content of about 1.25%. The pellets then flowed by gravity from a charging hopper into a natural gas-heated chamber, which preheated the charge to 300 C.

As the hot pellets entered the coking retort, natural gas was blown in at the bottom of the unit. The gas then decomposed at 1220 C in the bed of white-hot coke, and carbon derived from the decomposition combined with volatile components of the coal. Disintegration of the pellets, which would result if coal solids had to supply all of the carbon for the reduction reactions, was thereby prevented.

Natural gas requirements of the operation are about 18,000 cu. ft./ton of soft coal—8,000 cu. ft./ton for the thermal decomposition reaction, 10,000 cu. ft./ton for external heating of the retort and feed preheater. Time required to go from pellet to coke: about 80 minutes.

Product Balance: Coke produced by the pilot unit is described as hard, "construction-type" pellets, ranging in size from 5/16 to 7/8 in. Volatile content of the coke is less than 1% (compared with 40-45% in the raw coal), sulfur runs 0.5-0.6%, and ash content is about 10%.

As do conventional coking operations, U.S. Fuel's process yields by-product coal oils and tars—about 45-50 gal./ton of soft coal. In addition, the combination of decomposition products from natural gas and coal gases creates 18,000-25,000 cu. ft./ton of "reactor gas" containing 85% hydrogen.

Reactor gas could be burned for the external heating of the process units. However, U.S. Fuel experts point out the possibility of utilizing this hydrogen-rich by-product for the hydrogenation of coal oils to produce automotive-grade gasoline. Most previous coal carbonization processes, they add, attempted to use the hydrogen off-gas for burning within the retort chamber. But the presence of nitrogen (almost 15%), which leads to formation of a friable char, rules out this alternative.

What's Ahead: U.S. Fuel hasn't revealed details of its plans for commercial development of the new coking process. It does say that the next logical step would be construction of a $250,000, 50-tons/day unit to produce enough coke for operational experiments in nearby phosphorus and steelmaking industries.

A commercial-size unit to supply 100,000 tons/year of coke for the Intermountain area's phosphorus industry would cost about $2 million. Cost of coke from a plant of this size, U.S. Fuel estimates, would be substantially below the price that elemental producers pay for Eastern coke. In fact, the estimated cost of a 50-tons/day retort is $50,000 less than a conventional coke oven of the same size.

On the other hand, FMC's $3.5-million plant is designed to turn out about 250 tons/day of coke from 500 tons of low-grade coal. Although this works out to a higher cost per ton of capacity than U.S. Fuel's proposed plant, the Kemmerer installation is admittedly a demonstration unit, may not reflect valid economic comparisons.

One thing both firms can count on: an interested audience of carbon-consuming Intermountain processors rooting for their success.

PROCESSES

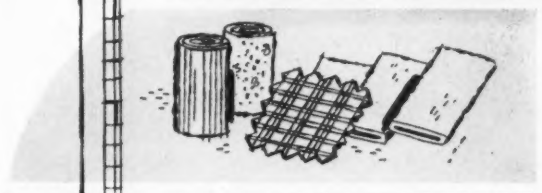
Hydrogen Sulfide Removal: The Fabrika Azotnih Dubriva (Pancevo, Yugoslavia) will use the alkazid process to remove hydrogen sulfide from synthesis feedgas for an ammonia plant to be completed in '60. In the process, an aqueous solution of alkaline salts and amino acids absorbs hydrogen sulfide. The solution can be regenerated in a distillation tower.

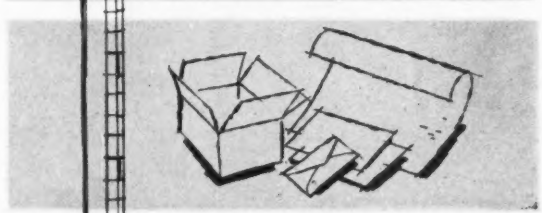
•

Silver Catalyst: Deutsche Gold- und Silber-Scheideanstalt AG. (Frankfurt, Germany) has developed a sponge-metal silver catalyst similar to Raney-nickel in physical properties. It is produced by alloying silver with 20-60% (by weight) calcium, magnesium, antimony, zinc, or barium. The brittle alloys are powdered and leached with dilute acid to dissolve the alloying element, leaving the pure silver sponge-metal. Unlike Raney-nickel, which is used primarily for hydrogenation, the new catalyst is said to be suitable for organic oxidation reactions.

NEW HIGH-GRADE AQUA AMMONIA from SOHIO

to meet your most exacting specifications





Sohio's high-quality aqua ammonia — from one of industry's most advanced petrochemical plants — starts with pure condensate. Concentration of filtered product is automatically controlled . . . with final quality tests after loading. Combine this formula for superior-grade aqua ammonia with dependable, fast service and you can see why it pays to call Sohio first for your aqua.

- **Specifications** — Made more rigid than ever. Call the man from Sohio and discuss with him your own specification requirements.
- **Service** — Sohio's production and storage facilities provide aqua ammonia "on the shelf" for prompt shipment. Specially designed tankers equipped with self-contained pumping units unload directly to your tanks. Tank cars unload top or bottom to match your storage.

When you need highest-quality aqua ammonia and fast service, call the man from Sohio.

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SOHIO

SOHIO CHEMICAL COMPANY

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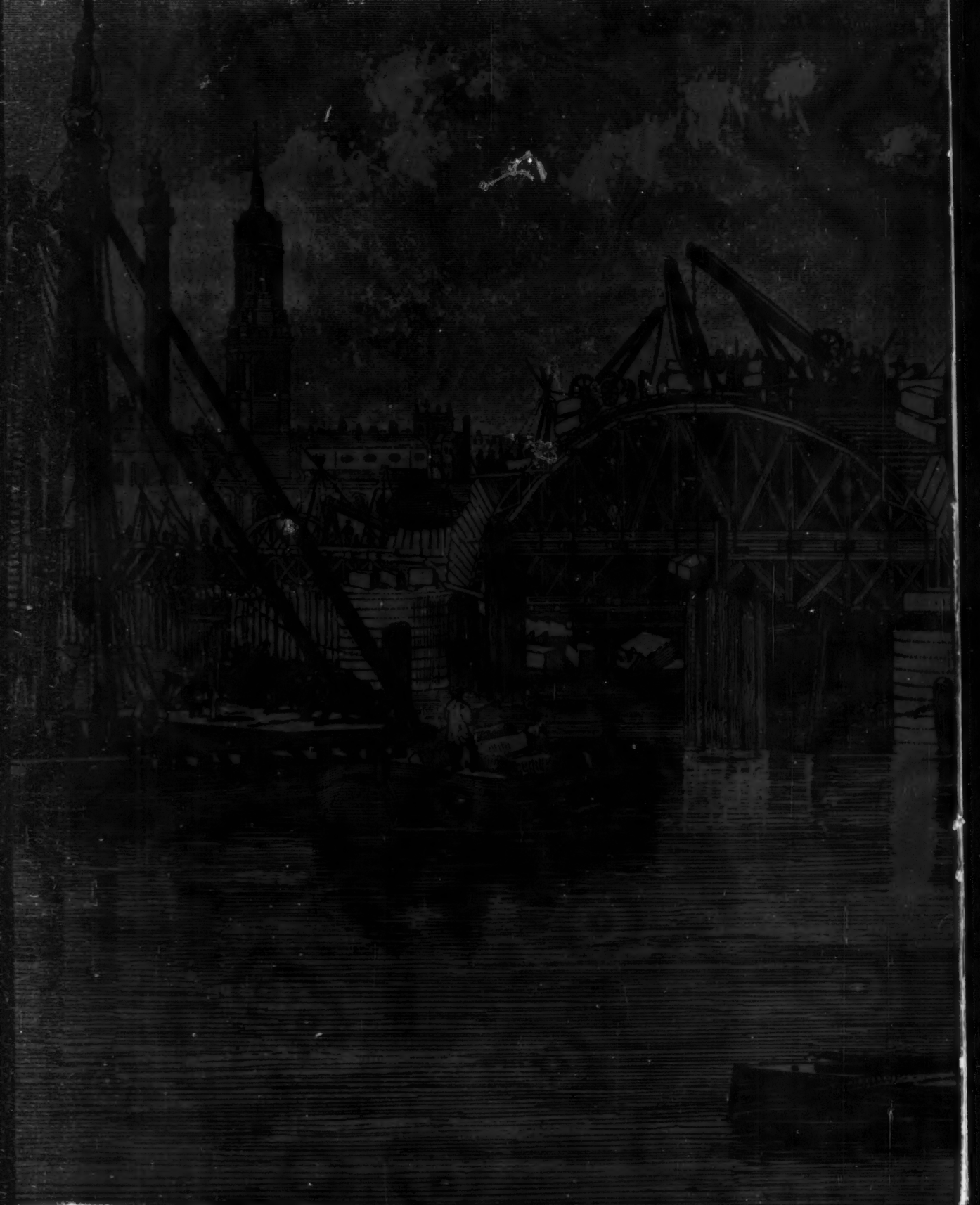
Phone CApitol 5-8015 or wire (TWX call letters LIMA O 497-U)

Imaginative Man.

Men with creative imagination often achieve what other men merely consider. One such imaginative man was Peter of Colechurch, chaplain and bridgemaster. He engineered the building of the Old London Bridge, the first masonry foundation bridge to be built in a tidal waterway. Begun in 1176, the project presented almost insurmountable engineering problems. Yet 33 years later the job was done . . . the work of Imaginative Man.



Outstanding among the feats of today's Imaginative Man is the speed with which bench-scale chemistry is translated into full-scale chemical manufacture, with product uniformity controlled to precise laboratory standards.

This requires a high degree of creative imagination combined with broad practical knowledge. Fluor's 25 years of design, engineering and construction for the chemical process and refining industries includes experience with all types of unit processes and operations.

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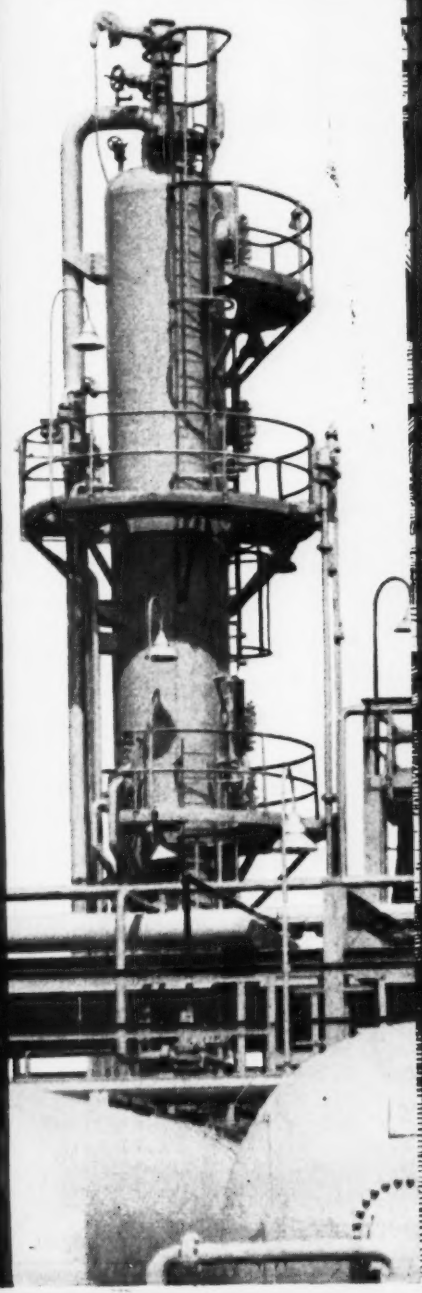
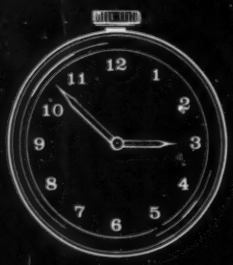
for the Process and Power Industries



Another problem solved with

2-NITROPROPANE

PROBLEM:



To reduce pigment grinding time by getting better wetting of the hydrophilic pigments by vehicles.

SOLUTION:

2-NITROPROPANE (2-NP) is highly adsorbed on pigments — it will displace moisture. Only 1% of 2-NITROPROPANE (2-NP) based on the weight of the pigment is required. Also — it's volatile — can't weaken the film. Here are some of the results you can get:

1. Reduced grinding time.
2. Uniform color development with tinting pigments.
3. Improved weathering qualities.
4. No residual dispersing agent in the film.
5. Settled pigment remains fluffy — easily redispersed — no hard caking — no long stirring before use.
6. Lower cost than most dispersing agents.

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IN CANADA: MacArthur Chemical Co. (1958) Ltd., Montreal • IN MEXICO: Comsolmex, S.A., Mexico 7, D.F.

Chairman Charles L. Huisking and President William Huisking discuss plant-construction blueprints.

Moving More Deeply into Manufacturing

In the next few months, production of synthetic camphor will go on-stream at Clintbrook Chemical Division of Chas. L. Huisking & Co. (New York). Production of the synthetic—by a process acquired recently from Du Pont — marks another step by Huisking away from its 50-year role as exporter-importer and distributor of drugs and chemicals. New course: toward making specialty chemicals.

In addition, the company has slated these other ventures into manufacturing in '60: production of dimethylol urea (also a quondam Du Pont operation), production of sorbitan fatty acid ester and polyoxyethylene sorbitan fatty acid esters (competing with Atlas's Span and Tween emulsifiers) and, in Europe, production of high-melting-point polyglycol waxes. The latter operation will be a joint venture and is currently under negotiation.

These moves mark Huisking's evolution into a significant factor in the industry as a manufacturer—instead of simply merchandiser—of specialty chemicals for many industries.

Huisking's entry into manufacturing has been so sudden that there's some confusion in the trade about the actual makeup of the company. And being a 100% family-held concern—not subject to government disclosure requirements, as are publicly held companies—there's little published material available as a guide to the direction the company is taking.

Guideline: As now constituted, the parent company is made up of three divisions: Glyco Chemicals, Peder Devold Oil Co. and Clintbrook Chemical Co.

- Glyco manufactures dimethyl hydantoin and derivatives, and a line of emulsifying agents, polyhydric alcohol esters, and synthetic waxes (Acrawax C) at Williamsport, Pa. It is also currently producing derivatives of ethylene oxide and hydrogen cyanide.
- Peder Devold Oil is probably the largest importer and seller of cod liver oil and other vitamin oils in the U.S. Although it has the same name as its Norwegian supplier in Aalesund, there's no longer a corporate tie between the two.
- Clintbrook Chemical manufactures camphor, theobromine salts, procaine base and procaine hydrochlo-

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New Light Colored Modified Polystyrene Emulsion For Floor Polishes

NeoRez S-71

Formulators anxious to achieve new lightness of color for their floor polishes will welcome this new emulsion. In addition to its exceptional light color, NeoRez S-71 imparts excellent gloss and leveling properties. It is highly stable, and has an unusually wide compatibility with waxes and resins.

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NeoRez ST

Used by many formulators for many years, NeoRez ST provides superior leveling, minimizing "crawling" and "puddling", even on difficult substrates. It imparts a rich, deep gloss and exceptional resistance to dirt. In formulating, NeoRez ST has low plasticizer requirements.

Write for samples and new comprehensive bulletin.

Polyvinyl Chemicals, Inc.
26-6 Howley Street, Peabody, Massachusetts

ride and para-amino benzoate at Lyndhurst, N.J. This plant, is also used as a base for resale of acetic acid, acetone and methanol, has storage capacity of around 1 million gal.

The company's payroll totals about 260. Sales and executive offices are in New York City.

For a relatively small company (CHEMICAL WEEK's estimate of sales; $7-10 million/year), Huisking has a varied product mix—much of it seemingly unrelated. But if the product lines do not dovetail, it's probably because of the company's desire to establish a broad base of manufacturing as quickly as possible rather than wait for an opportunity to integrate its operations.

Huisking's decision to go deeper into manufacturing stemmed from several postwar factors: the dollar shortage overseas, the profit pinch due to the inflation in the U.S., and U.S. companies' trend toward manufacturing and distributing their own products overseas rather than using sales agents (such as Huisking).

Flashback: The company was started in 1910 under Charles Huisking, its present chairman, as an importer and exporter of drugs and chemicals. Then only 25 and the youngest drug broker in the U.S., Huisking was already a veteran of 12 years in the industry, having worked since he was 13 with Thomas M. Curtius, a drug broker in New York City's Platt Street.

In 1913, Huisking acquired the Platt Street building from the Curtius estate; and in '17, the business was incorporated as Chas. L. Huisking, Inc., with Charles Huisking as president and his brothers George and Joseph as secretary and vice-president, respectively. Shortly after incorporation, the Huisking brokerage house also became an agency, commission merchant and trading business in drugs and chemicals.

In '18, the company became one of the three U.S. distributors of the Italian Conti Castile Soap; and six years later, Conti Products Corp. (New York City) was organized, with Charles Huisking as president. Soap products were turned out in a converted bakery plant in Brooklyn until this operation was sold to J. B. Williams (Glastonbury, Conn.) in '49. Later, Pharmaceuticals Inc. (Newark, N.J.) acquired the Conti line when it took over J. B. Williams.

Huisking, with a growing export business, opened up a London office in '20; and tied up with the firm of Henry Wheeler & Sons to form Wheeler & Huisking Ltd. four years later. The affiliation lasted until July '58, when Huisking's interest was sold to Wallerstein Co. (a division of Baxter Labs).

In the late '20s, Huisking became the sole U.S. distributor for Peder Devold Cod Liver Oil. It is still the biggest handler of cod liver oil in this country. Although synthetic vitamin has largely replaced cod liver oil as a source for vitamin A, this hasn't seriously hurt Huisking's sales. Most of the company's cod liver oil is sold not for human consumption but rather as an animal feed supplement, in which the cod liver oil provides a source of fat as well as vitamins A and D.

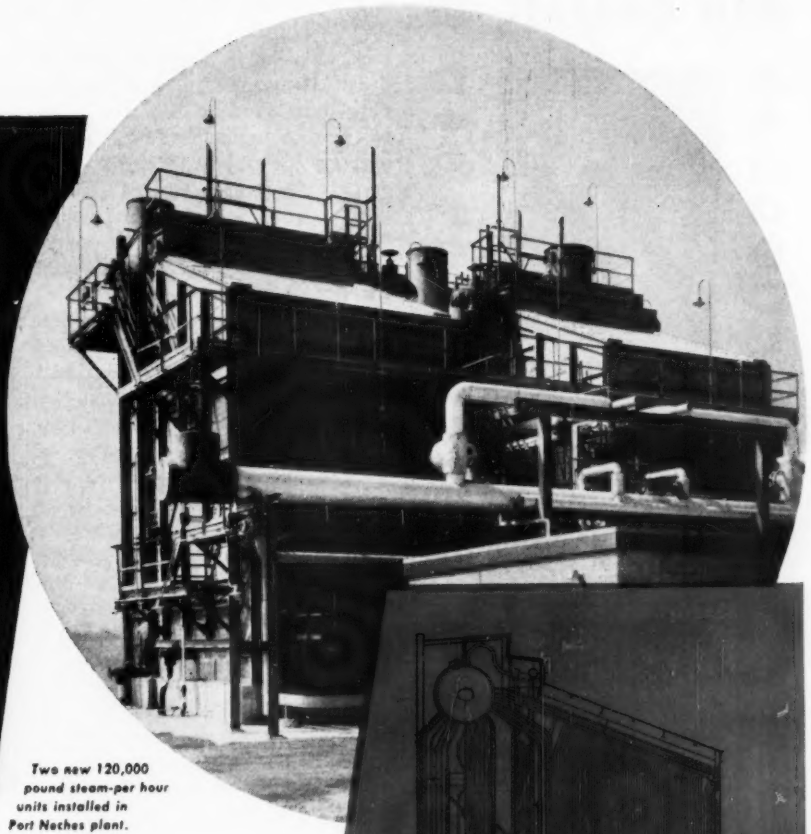
Purification and blending of cod liver oil, along with production of a deworming agent (Santonine), constituted most of the manufacturing operations of Huisking during the '40s. The company continued to derive the bulk of its sales dollars from its export-import operations.

More Manufacturing: Huisking moved to a larger plant in Brooklyn's Clinton Avenue in '51. Two years later, it took over the tableting of camphor from Du Pont. In line with increasing stress on manufacture, the firm set up a subsidiary corporation to carry on manufacturing operations. The first suggested name, Clinton Chemicals, had to be abandoned because it conflicted with another company's title; the company reincorporated under the Clintbrook appellation.

A major manufacturing expansion came in '56, when Huisking purchased facilities of William S. Gray & Co. at Lyndhurst for a reported $360,000. Although Huisking didn't take over the company's name, it did agree to carry on its operations as supplier of methanol, acetone and acetic acid. Equipment for the manufacture of procaine, primarily an anesthetic, was installed at Lyndhurst in '57; and within a year, Clintbrook Chemical was manufacturing procaine base and procaine hydrochloride and para-aminobenzoic acid and its salts.

Biggest step in its evolution into the role of chemical manufacturer

Steam for Jefferson Chemical by Vogt

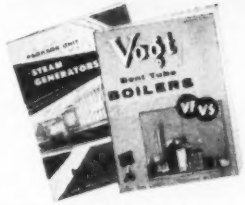


Two new 120,000 pound steam-per hour units installed in Port Neches plant.

The needed additional power and process steam capacity for Jefferson Chemical's expanded Port Neches plant is furnished by the two Vogt boilers pictured here, each with a capacity of 120,000 pounds per hour. The boilers are designed for 675 lbs. pressure to operate at 625 lbs. pressure and 769°F. total temperature. The furnaces are equipped with gas burners and have water cooled front and side walls.

Bulletins describing Vogt boiler installations in a variety of industrial plants for power, processing and heating are available on request.

Installation by C. F. Braun and Co., Engineers.



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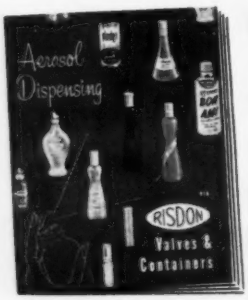

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To up-date your knowledge of what's new in aerosol dispensing and packaging, send for this free Risdon booklet. It covers the complete Risdon line in 16 colorful, illustrated pages. Helps you to select the type of Risdon valve or dispenser best suited for your product whether packaged in glass, metal or plastic.

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THE RISDON MANUFACTURING CO.
AEROSOL DIVISION
NAUGATUCK, CONN.

RI-116

took place when Huisking acquired the assets and operations of 30-year-old Glyco Products Co. for a reported $1.5 million in '58. This acquisition involved Huisking more deeply as a supplier to the plastics, paper, electronics, paint and textile fields. It also made the firm a source of dry bleach—in its early commercial development at that time.

It's expected that Huisking will develop most of its future incursions into manufacturing around the Glyco operation—which now accounts for 50% of Huisking's sales—since Glyco is undertaking a heavy program of research into hydrogen cyanide and its derivatives. In this field, Glyco will be relying strongly on experience it gained using hydrogen cyanide (with ammonia, carbon dioxide and acetone) in the synthesis of dimethyl hydantoin.

Although Huisking hasn't given up its export-import operations (still an important factor in such items as chlorophyll, fish scale oil and quinine products), it's obvious that after 50 years in business the company is now firmly committed to manufacturing.

Rosy Outlooks

Two specialties makers have looked at prospects for business in '60 and found the outlook cheery.

In the fragrance field, Charles Walker, president of International Flavors and Fragrances Inc. (New York), predicts retail sales of consumer products containing fragrances will top last year's $8 billion. He sees improved organic synthesis producing better and more stable materials at lower cost, as well as upgrading of all types of products. Expansion of the world market for U.S. products will continue, he says, particularly in Europe, where improved methods of distribution, rises in disposable income, and lowering of tariff barriers will help U.S. export sales.

S. C. Johnson & Son (Racine, Wis.) also sees improved prospects, expects its business to set highs in '60, with the aid of an accelerated program of product diversification.

"Sales in '59 alone rose 21% over the preceding year, and we expect a further jump of about 10% in '60," forecasts Howard Packard, Johnson president. He revealed that one of the firm's major entries into the wax field this year would be an auto-care product.

Also expected this year, is opening of Johnson's million-dollar aerosol plant at Racine. It will contain manufacturing facilities and filling lines for production of pressure-packed products in the auto, insecticides, and furniture polish lines.

PRODUCTS

Rust-Inhibiting Primer: Consolidated Chemical & Paint (456 Driggs Ave., Brooklyn, N.Y.) is offering a rust-inhibiting primer that, it claims, dries to a hard, impact-resistant coat in 15 minutes. It's called Jet-Dri Multi Surface Primer and dries to salmon-colored coat, is easily covered by a single finishing coat. It can be applied by brush, roller, spray or dip.

•

Textile Dye: Irgalan Brown GRL, a dyestuff for use on wool, nylon or silk, has been added to Geigy Chemical Corp.'s (Ardsley, N.Y.) line of neutral-dyeing premetalized colors. It has a reddish cast in artificial light and is said to have excellent fastness to light, even in pale shades on nylon.

•

Metal Coating: Industrial Finishes Co. (1119 Land Title Bldg., Philadelphia) is marketing an epoxy acrylic coating for metals under the tradename EP-ACK. It's available in 0-95 degrees of gloss.

•

Silica Sol: Nalco Chemical (6216 W. 66th Place, Chicago, Ill.) is offering a 50% concentrate of silica sol containing 49-50% silica by weight. It's called Nalcoag 1050, is available in 55-gal. drums.

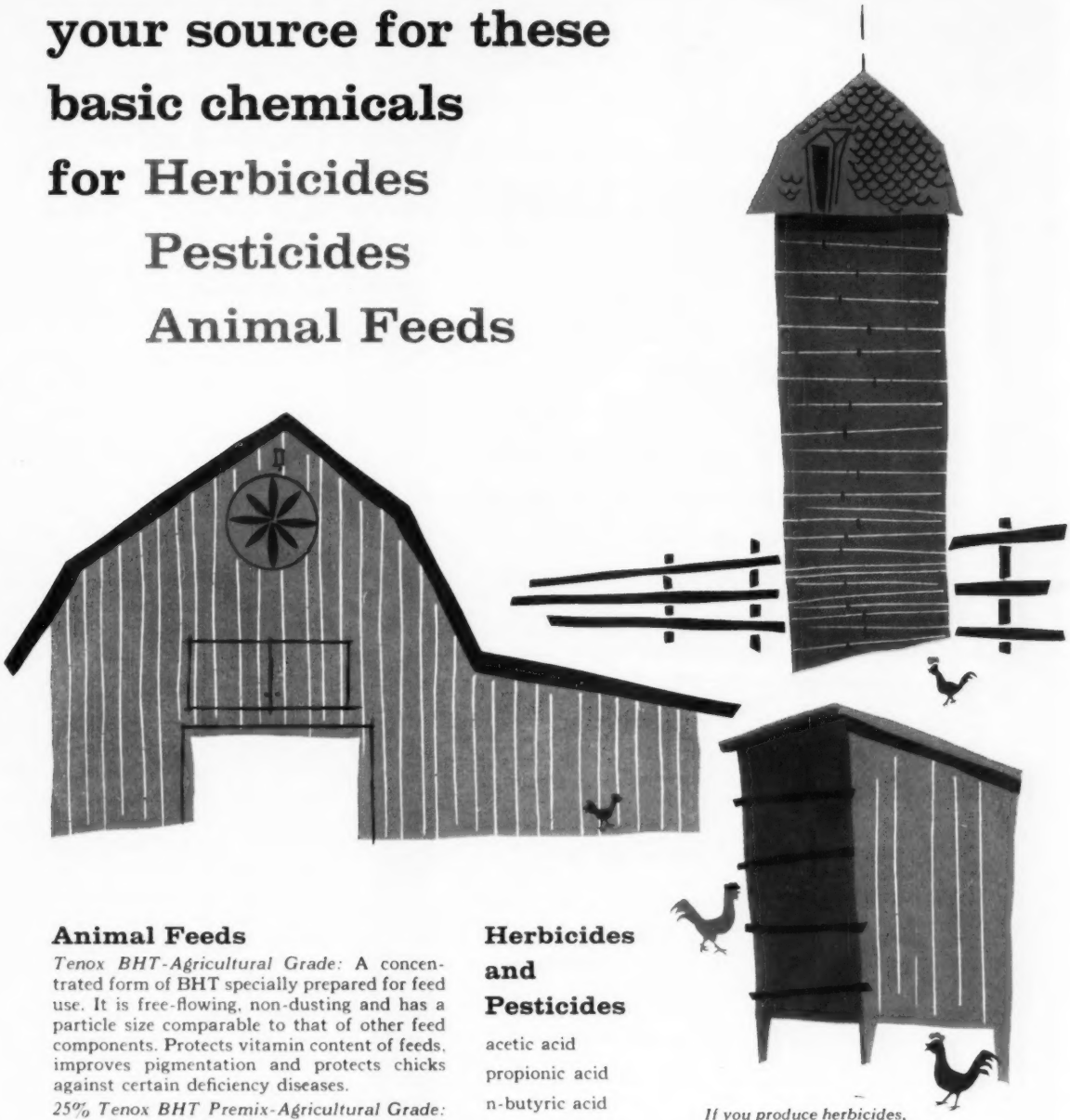
•

Household Glues: UHU Products Corp. (820 Greenwich St., New York, N.Y.) has added two products to its line of imported household glues. UHU-Hart is used for wood, balsa, and similar surfaces. UHU-Plast is intended for plastics repair and model hobby work. Both come in tubes with long-nosed applicators.

•

Wire Enamel: General Electric (Schenectady, N.Y.) is offering a new Class F wire enamel said to be capable of withstanding temperatures of up to 175 C. Enamel is claimed to have excellent "runability," enabling it to

Make Eastman your source for these basic chemicals for Herbicides Pesticides Animal Feeds



Animal Feeds

Tenox BHT-Agricultural Grade: A concentrated form of BHT specially prepared for feed use. It is free-flowing, non-dusting and has a particle size comparable to that of other feed components. Protects vitamin content of feeds, improves pigmentation and protects chicks against certain deficiency diseases.

25% Tenox BHT Premix-Agricultural Grade: An antioxidant formulation containing 25% BHT on a nutritive cereal carrier, designed specifically for feed manufacturers not equipped to perform the more exacting measurements required in handling the concentrated grade.

Tenox R: An easy-to-handle, fat-soluble formulation of butylated hydroxyanisole(BHA) and citric acid for stabilizing inedible fats used in feeds and feed supplements.

Tecmangam: A readily assimilated, completely soluble source of manganese for animal feeds, containing 75-78% manganese sulphate. In manganese-deficient areas, Tecmangam can be added to fertilizer to supply this essential element.

Herbicides and Pesticides

acetic acid
propionic acid
n-butyric acid
isobutyric acid
2-ethylhexoic acid
ethyl alcohol
isobutyl alcohol
2-ethylhexyl alcohol
2-ethylisohexyl alcohol
isobutyronitrile
manganese sulphate (Tecmangam®)
triethyl phosphate

If you produce herbicides, pesticides or animal feeds, look to Eastman for your basic chemicals; for samples, write to your nearest Eastman sales office. For properties and shipping information on these as well as other Eastman products, refer to Chemicals Materials Catalog, page 395 or Chemical Week Buyers' Guide, page 97

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t-BUTYL PERBENZOATE	95.0% (Min.)	
Active Oxygen	7.8% (Min.)	

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Solvent	Concentration (Moles, liter)	Temperature (°C.)	Half-Life (Hours)
Benzene	0.2	85	130.0
		100	18.0
		115	3.1
		130	0.55

Excellent results are obtained by utilizing t-BUTYL PERBENZOATE for the polymerization of acrylates and the high temperature curing of polyesters. This liquid peroxyester has also found wide-spread use in the preparation or compounding of various silicones, silicone rubbers and polyethylene. Details on many other varied applications on request.

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1740 MILITARY ROAD
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be applied to all sizes and shapes of magnet wire.

•

Carpeting Compound: A self-curing latex compound for carpet backing has been developed by the Naugatuck Chemical Division, U.S. Rubber Co. Lotol L-4634 is said to have good heat and light-aging characteristics, won't stain carpet facings or cause odors. It is also claimed to save processing steps; there is no need to add plastic latexes or hard resin extenders, and the latex has good tuft and pile lock.

•

Roof Coating: Allied Chemical's Barrett Division (New York) has come up with an aluminum-containing roof coating claimed to improve with age. Basically a coating for renovating old composition roofs, the coating is designed to cover cracks, protect dried-out felt base. It insulates by reflection, and gives a bright appearance. The asphalt-based product will be available first in either fibrated or unfibrated 5-gal. cans; later in 1-gal. cans.

•

Mite Control: A low-residue powder formulation of Tedion (90%)—tetrachlorodiphenyl sulfone—for control of mites on roses, carnations, etc., has been developed by Niagara Chemical Division, Food Machinery and Chemical Corp. (Middleport, N.Y.), and is being marketed through greenhouses. A single application is said to be effective from six to 10 weeks, leaves minimum residue.

•

Pool Chlorine: Marlin Pool Equipment Co., division of Paddock of California (8400 Santa Monica Blvd., Los Angeles), has developed a powdered, chlorine-containing water conditioner for home pools. It's designed to replace bottles of liquid chlorine compounds and is reportedly less irritating to swimmers. The firm claims that a month's supply of PadChem PC3 (normally 15 two-ounce envelopes) will do the same job as 12 gal. of liquid chlorine formulations. The product is available in boxes containing 15 envelopes or in 25-lb. drums.

•

New Adhesive Paper: A new industrial adhesive has been introduced by Reichhold Chemicals, Inc. The new product—a dry phenolic resin supported by a paper film—called

Plyophen 2000-PGL, is reported to eliminate the need for glue-spreading equipment and to provide a number of advantages over liquid glues.

The paper glue is currently available in standard widths of 38, 50 and 62 in.

•

Bonding Agent: A new specialty adhesive for Mylar, polyethylene and other glossy surfaces is now being marketed by Raybestos-Manhattan, Inc. (Bridgeport, Conn.). Named R-84002, the adhesive is based on a thermoplastic type of synthetic resin. Price: $1.65/lb. range.

•

Hickory Flavoring: Florasynth Laboratories (7300 North St. Louis Ave., Skokie, Ill.) is offering Smoke Yeast Flavor, a natural flavoring with good shelf life, claimed to be stable to high processing temperatures. Some products for which the flavoring is suggested include baby foods, dehydrated soup mixes, cheeses, condiments and sauces.

•

Hospital Sheeting: A lightweight, waterproof hospital sheeting that can be sterilized has been developed by Fabrikoid Division of Canadian Industries Limited (Montreal). The product consists of a polyester fabric coated on both sides with a specially formulated rubber. It will be marketed under the name 507 Terylene Hospital Sheeting. The brick-colored sheeting is said to resist action of oils, acids, alkalis, and body excretions. It is available to hospitals in 25-yd. rolls (40 in. wide), $2.27/yd.

•

Aerosol Lubricant: The J. F. Withers Co. (Escondido, Calif.) is marketing a pushbutton lubricant for gears which do not run in oil. Called Marla Spray Lubricant, the heavy-duty product is especially suggested for cams, lathe beds, monorails, chains and cables. Price: $2.29/16-oz. can and $12.37/six-can case.

•

Antistatics: Aimed at thermoplastics, thermosets, polyethylenes and synthetic fibers are Merix Chemical Co.'s (2234 East 75th St., Chicago) new antistatics for plastics: No. 79, for polystyrenes, styrenes, vinyls; No. 79-OL, for permanent destaticizing of polyethylenes. In commercial use, the cost is $24 for a case of two dozen 8-oz. bottles.

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Whether linked with alcohols to make plasticizers or lubricants; with glycols to make polyesters; with diamine to make nylon; with alkyds to formulate paint or coatings; or in researching for new products or improving old ones . . . Harchem 99% Sebacic Acid (CP Grade) gives your product maximum resistance to heat, cold weather, water and chemical or physical abuse.
Result? Improved product performance that stimulates sales and profits for you. Harchem technical personnel stand ready to work with your development people.
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IN CANADA: W. C. HARDESTY CO. OF CANADA, LTD., TORONTO

M. A. Thompson (*left*), Wyandotte Eastern District Manager, and Purchasing Agent W. F. Merrilees, of West Virginia Pulp and Paper Company, discuss the firm's fast-growing chemical requirements. Periodic review like this is one reason Mr. Merrilees says:

"It's a pleasure to work with Wyandotte"

"From our dealings covering a long period of years, we would appraise Wyandotte as a very dependable source for chemical raw materials," states W. F. Merrilees, Purchasing Agent, West Virginia Pulp and Paper Company, New York, N.Y.

"Wyandotte puts the customer's requirements first . . . is always on the job when we need them with helpful technical service. Wyandotte is research-minded, too . . . their products are uniform and of high quality. Over the years, they have demonstrated that they can grow with our needs. It's a pleasure to work with them."

Have you discussed your requirements for chemical raw materials with a Wyandotte representative lately? If not, next time he calls, give him the opportunity to show you how Wyandotte's expanded facilities and multi-plant operations may be of greater service to you. *Wyandotte Chemicals Corporation, Wyandotte, Michigan. Offices in principal cities.*

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POLYPROPYLENE GLYCOL • CHLORINATED SOLVENTS
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Bullet-Fast Tests Speed Fiber Research

This week, for an undisclosed client, Fabric Research Laboratories (Dedham, Mass.) is trying some new tests to predict how an untried fiber will handle in the textile mill. Among them: the ballistic test (right), which simulates the rough treatment that yarns get in modern high-speed textile machinery such as downtwisters, coning machines, and the like.

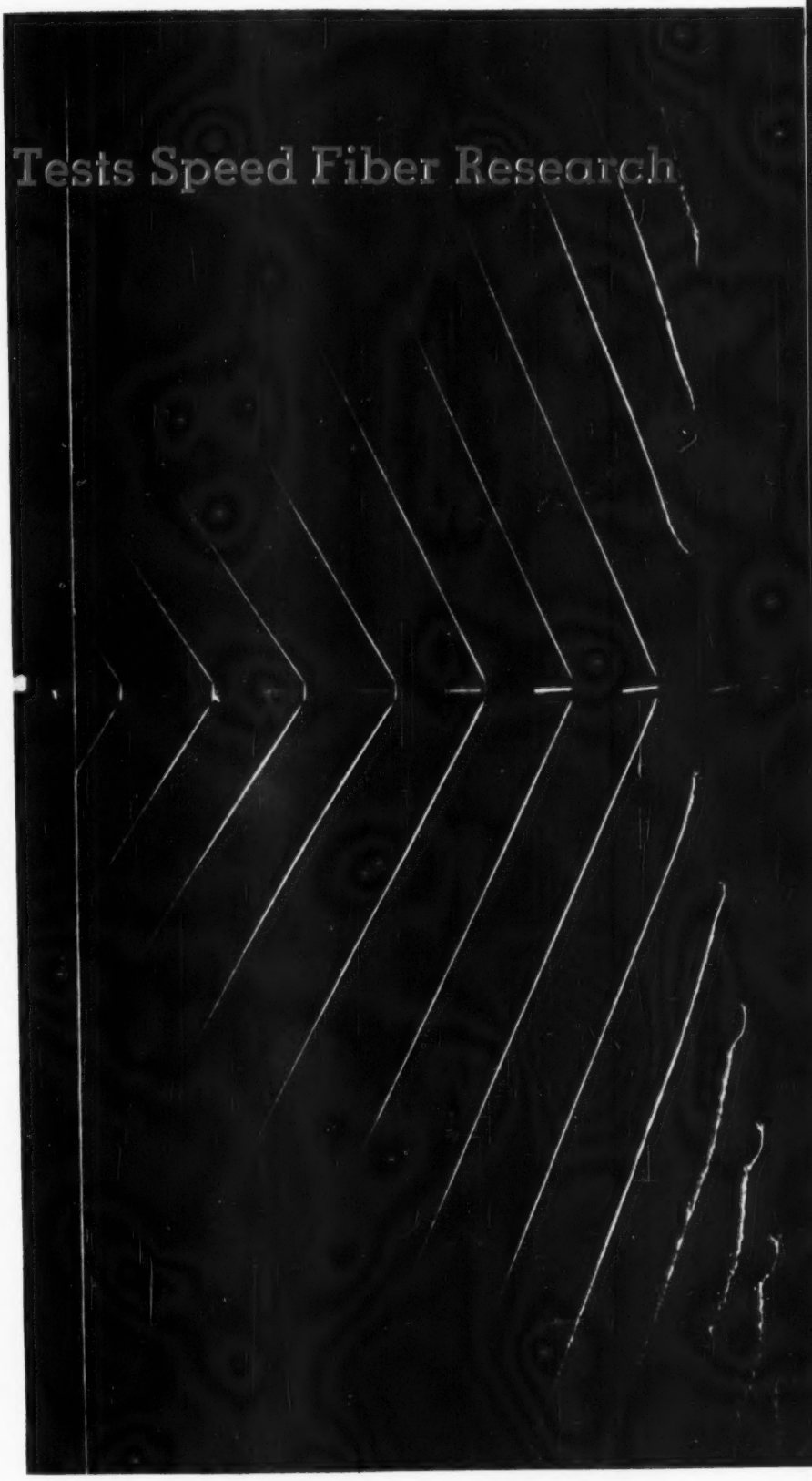
FRL's objective, shared by an increasing number of fiber researchers, is to sharply reduce the time lag between birth and commercialization of new fibers. The firm's associate director (one of three), Kenneth Fox, estimates that for a firm without experience this lead time can be reduced two to three years by testing that predicts both processing and end-use properties.

This can mean savings of $50,000 to several million dollars, says Fox, "depending on specific conditions that are never twice the same." If a fiber shows prohibitive shortcomings early in its history, of course, fruitless pilot expenses can be avoided.

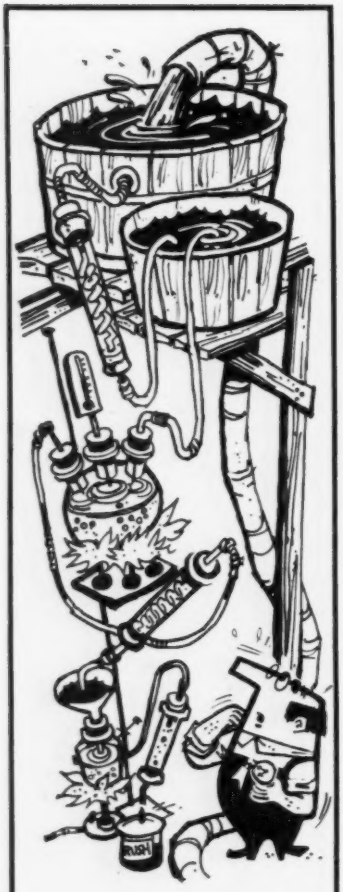
New tests are being developed because conventional laboratory equipment (which applies force to the test sample at a low rate) can't predict how a fiber will behave in full-scale textile machinery. Fast starts and stops (which impose high loading rates and sudden hard tugs on fibers) and high abrasion are characteristic of such machinery. These are the conditions FRL is approximating with its ballistic device.

This testing unit can produce loading rates up to 2,000 ft./second; a high-speed stroboscopic light allows 15 photos to be taken as the bullet passes through the fiber sample. While this test tells a lot about the fiber's stress-strain characteristics, results require complex interpretation.

Another device, newly developed by FRL and Celanese Corp., is a pneumatic tester with a loading rate of 15 ft./second, compared with about 3-4 ft./minute with the standard Instron tester. Used with electronic signaling and recording equipment, it



Strobe photos record fiber stress propagation in ballistic test.



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helps calculate stress-strain curves.

Celanese's Summit, N.J., lab is also evaluating a new test for fiber brittleness at high speed. The fiber sample is inspected microscopically after high-frequency agitation in a metal capsule containing a metal ball. There's no clear correlation yet between this test and the fiber's processing characteristics, but it helps spot poor fibers.

Room for Research: High-speed tests are only part of the growing arsenal of ways to probe a new fiber's commercial future. Among the properties on which information is sought: creep—the reaction of a fiber to prolonged low load; crystal structure—related, for example, to ironing temperature; ultraviolet resistance—how the fiber stands up to sunlight.

Some other tests, now becoming routine: microscopic studies of fiber cross-section, surface characteristics and uniformity; resonant frequency tests (on a Vibrascope) for precise determination of denier; stress-strain tests to the point of rupturing for calculation of modulus of elasticity, instantaneous elastic deflection and instantaneous elastic energy; repeated tensile tests at various levels of stress and strain to determine both immediate and delayed elastic recovery and nonrecoverable deformation; and a sonic test (on a pulse propagation meter) for precise measurement of instantaneous elastic deflection.

FRL's director, Walter Hamburger, explains that this kind of fiber test data can be translated into yarn and fabric properties: "We are able to talk about such functional end-item matters as resilience, crease resistance, drape and abrasion resistance."

Chemical Tests: A number of chemical variables must also be investigated before a fiber leaves the laboratory. Probably the most important (for a nonindustrial fiber) is dyeability, including the variety of shades obtainable, degree of dye fixation, dyestuff penetration and lightfastness. A producer can get much of this information with only 2-5 lbs. of fiber, but larger quantities are needed before dyestuffs can be specified for commercial use.

Other chemical qualities that can be studied at an early stage include receptivity to finishing compounds, resistance to chemicals, bleachability and moisture absorption.

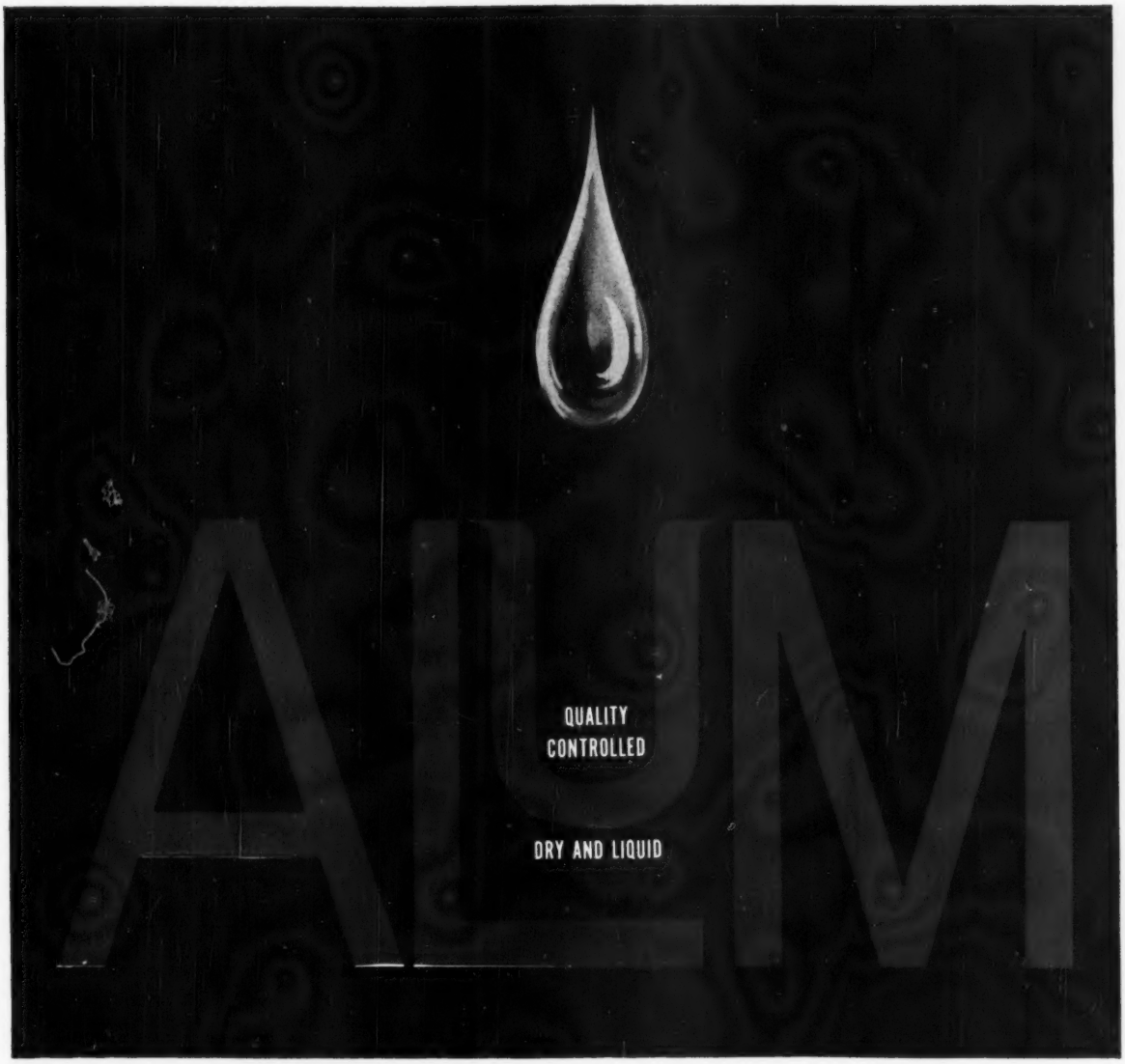
FRL's Fox: 'For untried fibers, savings of $50,000 to millions.'

Fiber researchers are quick to point out that there is no dramatic shortcut to proving out a new fiber, however. All the normal stages of development, including the pilot plant, they say, are still necessary, but the goal is to make them shorter, cheaper, more routine. Milton Harris, president of Harris Research Laboratories (Washington), puts it this way: "Improved early evaluation can shorten the time needed to commercialize a fiber, but field testing of the end-product will remain the only way to prove it out."

From Lab to Label: The early evaluation program undertaken by Celanese typifies the efforts of chemical companies to cut the time needed to advance new polymers from the laboratory to the label of a commercial garment. Russell Denyes, manager of fiber product research at the Summit lab, describes the company's system as a four-step sequence:

The first stage, applicable to polymers hand-drawn into as little as 1-10 grams of crude fiber, consists of studying basic properties such as melting point, crystallinity, surface characteristics, transition temperatures, etc., together with crude tests of tensile properties and dyeability. Most candidates are screened out here. The few that display unusual characteristics and no insurmountable weakness are tested further.

A more precise measurement of various tensile properties can be car-



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ried out in the next step, using microtechniques on 10-25 grams of fiber spun as continuous filament on miniature extrusion equipment. At this point, some consideration is given to choice of a commercial production process.

The third step is a spinning process study that can be made on 1-5 lbs. of fiber; it may require several months of work. Effort is concentrated on the best method of spinning the fiber (e.g., whether it should be wet-, dry- or melt-spun). A small amount of fabric is knitted for a dyeing investigation, and a crude cost study is made.

The final lab stage is to spin enough fiber on commercial equipment to make fabric for detailed dyeing and finishing studies at the Charlotte, N.C., plant of Celanese Fibers Co. (division of Celanese Corp.). This amount may be as small as 5 lbs. if the fiber is to be utilized as filament; 30-100 lbs. are required for fabric made from staple yarn. Successful clearing of this last hurdle brings about exhaustive studies of legal, marketing and manufacturing aspects before the fiber is cleared by corporate management for full pilot studies.

All fiber makers do a certain amount of early evaluation. Among the more extensive labs are Du Pont's Pioneer Research Laboratory at the Wilmington, Del., Experimental Station; Chemstrand's Decatur, Ala., lab, soon to be moved into new quarters in North Carolina's Research Triangle; and American Viscose's lab at Marcus Hook, Pa.

Outside Help: At one time or another, almost all fiber makers call on outside assistance in evaluating fiber potential. Textile Research Institute (Princeton, N.J.) and a number of universities exemplify the nonprofit facilities available, although much of their work is in broader areas than checking a given fiber.

A host of varied commercial laboratories are prepared to accept assignments of this nature. Some (e.g., FRL) are devoted exclusively to the textile field; others (e.g., Harris Labs) do a high percentage of textile work but specialize in other fields as well; still others (e.g., Arthur D. Little, Inc.) do a wide variety of work, including a small percentage in the textile area.

In addition to working for estab-

lished fiber producers, outside labs are especially helpful to the company that has had no fiber experience, but thinks it may have a commercial candidate —for example, FRL has done work for Air Reduction Co. and B. F. Goodrich Chemical Co.

Airco, which is now shaking down its new polyvinyl alcohol resin plant at Calvert City, Ky., is designing a plant for making the type of PVA (vinal) fiber it now imports from Japan. FRL was signed to study many phases of this program (including both technical and marketing aspects).

FRL worked with Goodrich early in the development of Darvan fiber (purchased last week by Celanese; *see p. 21*). Evaluation as long ago as '50 predicted the fiber's good resilience, low strength.

Whether working for new or experienced fiber makers, outside labs offer specialized equipment, added speed for a rush project and personnel trained in interpreting test results. In fact, Harris believes that better interpretation of results is the area in which specialized laboratories excel and in which further improvement will pay the biggest dividends.

Fibers now coming to market may have as much as 20 years and $10 million invested in them. New fiber evaluation tests may make significant reductions in the cost of future candidates.

EXPANSION

- Industrial Bio-Test Laboratories, Inc., is building a 10,000-sq.ft. toxicological research laboratory at Northbrook, Ill. Completion is expected early this year. Another lab, being planned, will be used for determining extractables in food packaging materials.
- Technical Assn. of the Pulp and Paper Industry (TAPPI) has moved into larger quarters (6,200 sq.ft. of floor space) at 360 Lexington Ave., New York.
- Magna Products, Inc. (Santa Fe Springs, Calif.), and General Mills, Inc. (Kankakee, Ill.), have established a cooperative research program on water flooding and crude oil production and refining problems. Products (e.g., corrosion inhibitors), formulations and information arising from this work will be made available to customers of both concerns.

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•The dredge "Markham", built for the Corps of Engineers, U. S. Army, will work on the St. Lawrence Seaway. *Its 42" diameter pipes and the main propeller shafts are protected with Permobond.* Permobond will provide longer life for pipes and shafts. Maintenance will be low, efficiency high. Avondale Marine Ways, Inc., New Orleans, Louisiana, both built the dredge and applied the linings.

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Newsletter

CHEMICAL WEEK
January 16, 1960

A 50% price cut on "diphenolic acid," 4,4-bis (4-hydroxy phenyl) pentanoic acid, will help move the intermediate closer to commercialization. S. C. Johnson's new price: 75¢/lb. vs. $1.50 in quantities of over 1,000 lbs. Purity has also been upped from 97 to 98% and the relative color improved. The firm plans to start construction before next fall of a 5-15-million-lbs./year DPA plant, projects an ultimate 40-50¢/lb. price. Coatings are the first big DPA target.

Paint formulators have found that alkyd formulations with isophthalic acid have a tendency to gel during cooking, reports Johnson. Small amounts (2-4%) of polyethers made by coupling DPA to dichlorethylether eliminate this problem, the firm reports. It also feels that DPA shows promise of giving the first practical way to make an alkyd resin compatible with cellulose acetate and butyrate to give a good-quality lacquer at low cost.

•

Mobile radiation sources for agricultural research are planned by the European Nuclear Energy Agency (ENEA). Object: to explore low-dose radiation's promise in extending the shelf-life of fruits and high-protein foods, preventing potato sprouting, and controlling food-borne diseases such as salmonellosis in dried eggs.

ENEA plans to equip two or three trucks with 20,000-30,000-curie cobalt-60 sources mounted in heavy shielding, which will be driven to various agricultural research centers in Europe. Total cost, including a "home-base" building, will be $1-2 million. ENEA will set up a study group to pin down details, hopes to have answers to major problems by June. The latter include financing (one probable solution: split the cost among government and industry-financed research centers interested in the project); administrative organization; and legal questions—the biggest of which involves transporting radioactive materials.

The U.S.'s decision not to build an atomic food-processing unit at Stockton, Calif., meanwhile, will be studied by the Congressional Atomic Energy Committee. About $1.3 million was spent on the $7.5-million project before it was canceled by the Army.

•

Startups of the two computer-controlled process plants were disclosed last week by B. F. Goodrich Chemical Co. and by Monsanto, both of which claim the distinction of being "first in the CPI."

BFG Chemical is using a Thompson-Ramo-Wooldridge RW-300 computer to control production of vinyl chloride monomer via cracking of ethylene dichloride. The monomer plant at Calvery City, Ky., was originally designed to be computer-controlled (*CW Market Newsletter, Jan. 24, '59, p. 74*) and, according to BFG Chemical President John

Hoover, is exceeding the company's expectations—particularly in operational data logging—during the current shakedown period.

Monsanto's installation also employs an RW-300, but was adapted to an existing ammonia plant at Luling, La. Monsanto Vice-President J. L. Christian reports that so far startup performance has been satisfactory, that the company expects the computer to yield maximum productivity at minimum operating cost.

•

Project "Cool Water," which will provide plant cooling water and cut pollution in the Buffalo River was approved by Buffalo, N.Y., Mayor Frank Sedita last week. The $7-million project, under discussion for three decades, will include pumping-station and water-distribution facilities for Donner-Hannah Coke Corp., Republic Steel, Socony Mobil and Allied Chemical's General Chemical and National Aniline divisions. The Buffalo River Improvement Corp., formed by the companies, will maintain the facilities for a 30-year period, after which the city will become sole owner.

The pumping station will draw 120 million gal./day of water from Lake Erie for cooling service in the companies' five plants. Continual discharge at high flow rate into the Buffalo River after plant use is expected to cut river pollution problems.

Similar city-industry agreements elsewhere in the U.S. will be increased in the future. That's evident from projections of water requirements made by the Dept. of Commerce and the President's Materials Policy Commission, which indicate that water usage will exceed 450 billion gal./day by '75. Usage in '59 approached 300 billion gal./day, according to water-treatment firm Nalco Chemical Co. Industrial and power-plant use accounts for 46% of the total; 54% of the industrial total goes for cooling, 32% for processing. Biggest water user: steel, followed by oil and paper of the chemical process industries.

•

Foreign car owners may be getting their own gas pumps at U.S. gas stations, if Socony Mobil's plan to push tetramethyl lead as a gasoline additive works out. Its research indicates that TML is better than TEL in certain engines of foreign design—but the discovery apparently isn't new. Ethyl Corp. says it has technical data and has filed for patents on TML and TEL-TML mix, would be able to supply TML by modifying existing facilities. Esso received a U.S. patent in '43 covering use of a wide variety of lead alkyls in motor fuels as antiknock components, particularly TML. Du Pont has also found TML is more effective in some gasolines than in others; it's studying plans for commercial production.

•

The first "full line" of colored solution-dyed acrylic fibers is claimed by Chemstrand. J. P. Stevens & Co., which assisted in development of the solution-dyed Acrilan yarn, will be the firm's sales agent to the hosiery trade.

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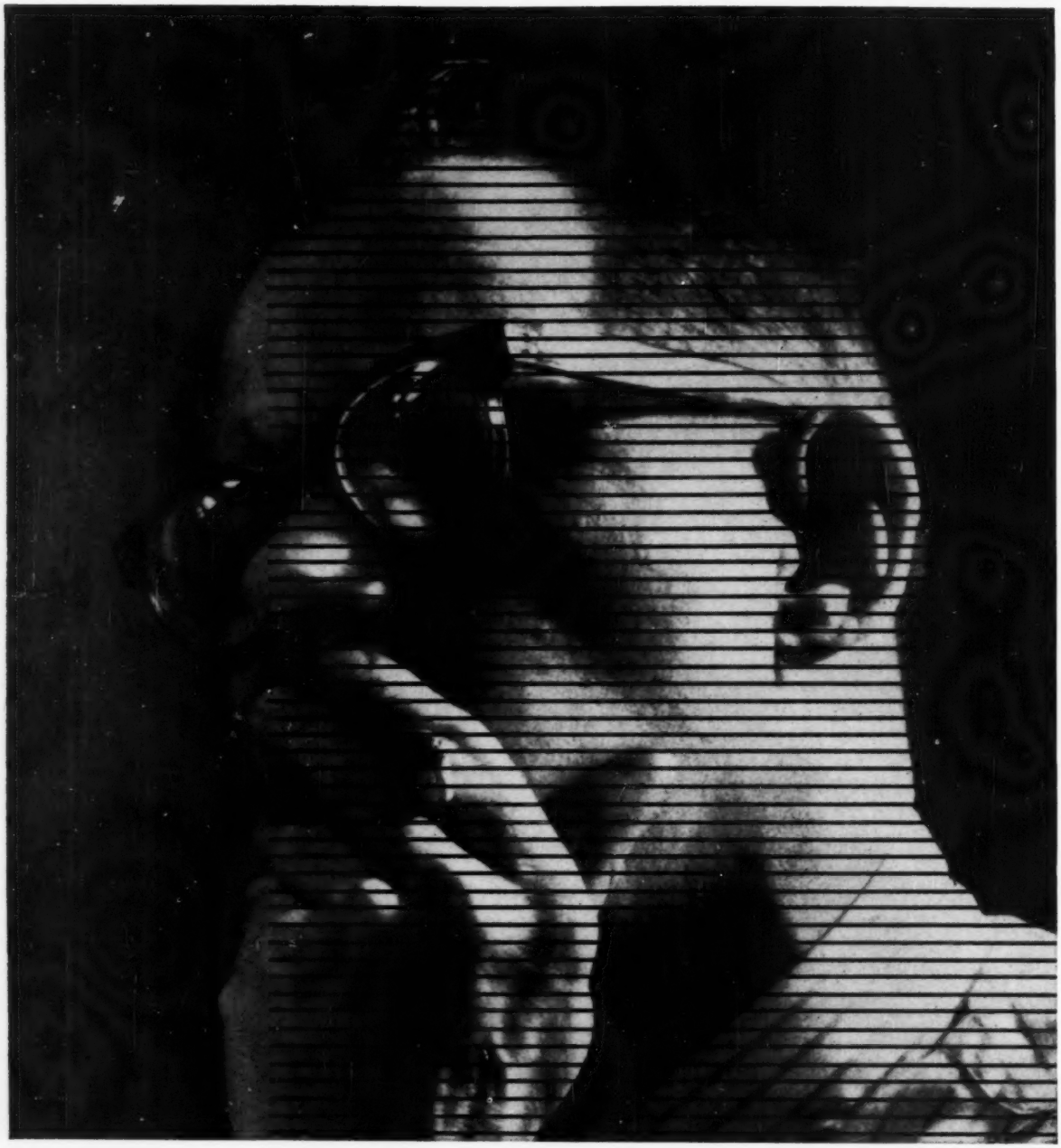

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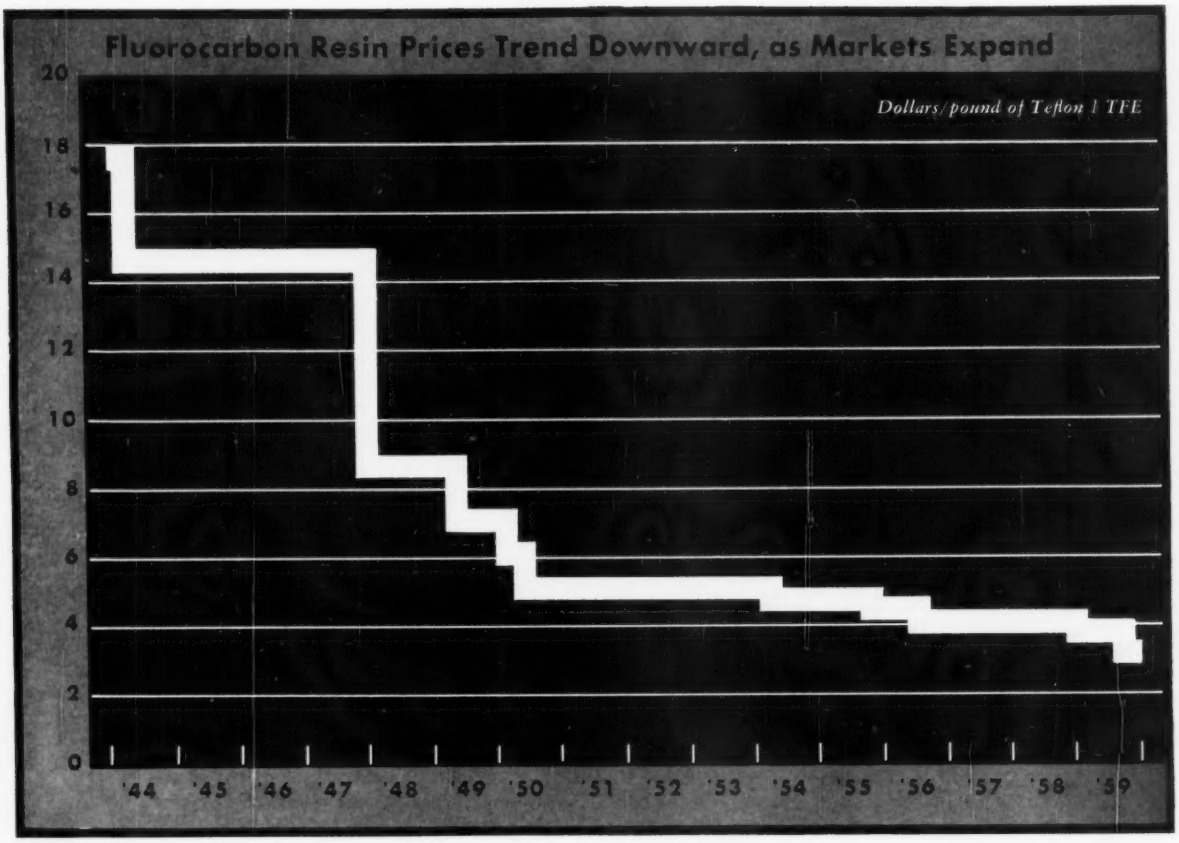

Fluorocarbon Resins Gear for New Markets

Within the next few weeks, Du Pont will expand its line of fluorocarbon resins, as Teflon 100 FEP* becomes commercially available. At the same time, the company will be moving into commercial production of film made from the FEP resin at its Buffalo plant. These two developments, plus price cuts totaling 20% during '59, indicate the prospect of substantially larger fluorocarbon markets in the next five years.

Largest producer of fluorocarbon resins is Du Pont. Several other companies have small but significant chunks of this relatively new, but growing, specialty resin market—e.g., Minnesota Mining and Manufacturing, Allied Chemical and Firestone Plastics.

Total market for fluorocarbons in '59 was about 7 million lbs./year—small compared with that of most chemicals. Assuming, however, an average price of $5-6/lb. for the resins, dollar sales will be in the range of $35-42 million/year—certainly a tempting sales figure.

Capacity Mounts: Although substantial amounts of fluorocarbon resins were made in pilot plants during World War II, commercial production began only in '50, when Du Pont started operations at its Washington Works near Parkersburg, W. Va. Since then, capacity has been increased several times. Teflon capacity figures are closely guarded, but best estimates are that Du Pont could turn out 10 million lbs./year of fluorocarbon resins at its Parkersburg unit. This does not include the new Teflon 100 FEP operation being built adjacent to the other Teflon operations, which will probably add another 2 million lbs./year to output.

Second-largest fluorocarbon resin manufacturer is Minnesota Mining, which manufactures Kel-F at its Jersey City, N.J., plant—acquired from M. W. Kellogg in '57. Output potential of 3M's unit is well below that of Du Pont—probably less than 1 million lbs./year.

Allied Chemical is another logical contender for this market, since it is a large manufacturer of anhydrous hydrofluoric acid and fluorocarbon products. It is already active in the fluorocarbon resin field, and is now turning out pilot-plant quantities at its Morristown, N.J., laboratories. Since Allied now manufactures the basic monomer, Genetron 1113, from which to make its own resins, it could easily get into commercial production by constructing a fluorocarbon resin plant near its Genetron facilities at Baton Rouge.

Meanwhile, further research for

* FEP is fluorinated ethylene propylene; other resins are ethylene based.

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new fluorocarbon resin products is being done at Morristown.

Allied is also in pilot-plant production of vinylidene fluoride monomer. This monomer, also made at Baton Rouge, perhaps could be polymerized or copolymerized into useful fluorocarbon resins.

The chemical division of Firestone Plastics Co. currently turns out a fluorocarbon resin solution, Exon 461, at Pottstown, Pa.

FEP Opens New Markets: Commercialization of Teflon 100 FEP will help open new markets for Du Pont. The properties of the other Teflon products requires special fabricating techniques in the processing of some finished products. This, of course, adds to the cost of the finished product. Now, the properties of Teflon 100 FEP permit fabrication by the more conventional thermoplastic techniques.

One new outlet for the FEP resin: film. Film from other types of Teflon was difficult to make and usually was not thinner than 2 mils, whereas the FEP resin can be extruded into film by several methods and is turned out as thin as ½ mil.

Du Pont is already starting commercial production of Teflon FEP film at its Yerkes Works in Buffalo, N.Y. The past year, the plant turned out limited quantities—several hundred pounds/month. Now with increased facilities, capacity is about 500,000 lbs./year.

Allied is also looking at the film market and is making films as thin as ½ mil at Morristown.

Plummeting Price: Another factor now stimulating the market for fluorocarbon resins is the continuing drop in prices.

The deep cuts in price of Teflon 1 TFE fluorocarbon resin (*chart p. 65*) is an example. In '44, during the product's pilot-plant days, its price was dropped from $18/lb. to $15/lb. Subsequent reductions brought the price down to $4.50/lb. at the start of '59. Last February, the tab was cut 40¢/lb.; and in November, it was reduced to $3.60/lb. It's likely there will be a further drop, but how far is a big guess. Some observers feel that it may go to $1.50-$2/lb.; others believe that $3/lb. would be more realistic.

There have also been cuts in film prices. The base price for Teflon FEP

film (thicker than 2 mils) was slashed from $29 to $15/lb., with tabs for 1-mil film going to $16.50/lb. and ½ mil to $20/lb. The higher price on the thinner film reflects the difficulty in making smaller-gauge film. A square foot of 1-mil Teflon FEP now costs about 18.5¢.

Prices of Kel-F and the Genetrons are higher than those of Teflon. Those materials cost around $6/lb.; but since they are easier to fabricate for some uses, the cost difference is somewhat offset.

Fluorocarbon End-Uses: One of the first markets for fluorocarbons was the military. While it's still an important outlet for the resins, the development of civilian markets has led to the use of fluorocarbon resins in many peacetime applications. A general market breakdown would put electrical applications first, followed by mechanical and chemical applications, in that order.

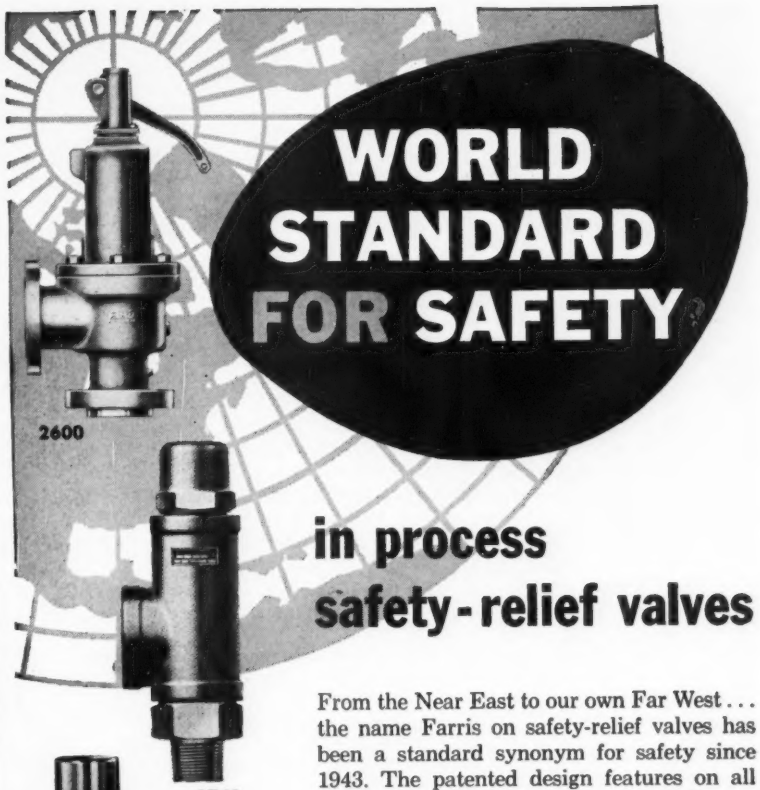
In the electrical field, fluorocarbon resins find wide application in insulation uses because of their electrical, thermal and mechanical properties. Wire insulation is probably the largest market for these resins. Other applications include use in transformers, motors, generators and electronic units.

In the mechanical field, fluorocarbons' low coefficient of friction, chemical inertness and nonadhesive properties permit their use in many specialty applications that can absorb the higher resin costs. Gaskets and "O" ring seals are two applications that take advantage of fluorocarbons' inertness and durability, while their lubricating properties are important in bearing and packing applications. In the baking industry—and in other operations where sticky surfaces are encountered—fluorocarbons' nonadhesive properties reduce cleaning time and product waste, allow machines to operate longer.

Other uses for the resins include extruded and molded sheet, rod and tubings.

Fluorocarbons can also be spun into filaments, which are braided into packing materials. Du Pont now produces Teflon yarn at Richmond, Va.

In the chemical field, major applications of fluorocarbon resins are based on the materials' chemical in-



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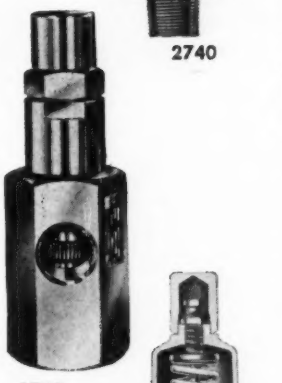

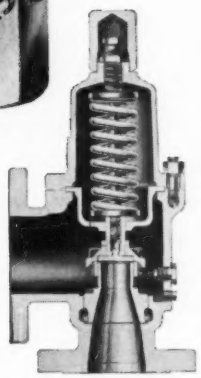

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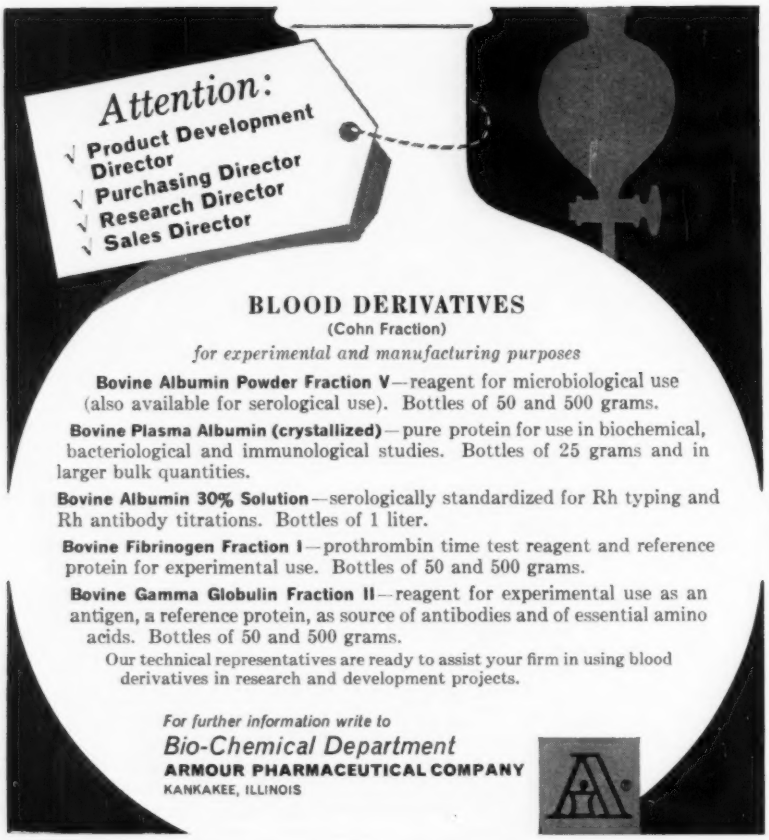

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MARKETS

ertness even at elevated temperatures. Typical uses: as gaskets and packing for valves and pumps, as a protective coating for tanks and containers. Some beakers, containers and test tubes have been made from the resins for use in the labs.

Several metals can be coated with these resins to give protection against corrosion, for use in tanks, pumps and pipe.

In the chemical industry, the fluorocarbon fiber is also made into cloths for filtering corrosive materials.

There is no doubt that fluorocarbon sales during the next 5-10 years will show steady growth. Behind these increases will, of course, be the continued (though probably slower) reduction of prices, plus the commercial development of new fluorocarbon resins, new forms and shapes in which they will be available, as well as new process technology to reduce the cost of the finished products.

MARKETPLACE

Honing Grit: A range of high-purity, finely divided alpha and gamma aluminas are now available in limited quantities from J. T. Baker Chemical Co. (Philipsburg, N.J.). Among their suggested uses: dentifrices; honing, buffing and grinding compounds; catalyst carriers. Price: $15/lb.

•

Name Change: The brandname of Allied Chemical's anhydrous ammonia is being changed from Barrett Brand to Allied Chemical Anhydrous Ammonia. Reason behind the move is the transfer of the sales responsibility for the product from one division to another. Originally handled by the company's Barrett Division, the product had been transferred to the Nitrogen Division, which now produces and sells the anhydrous ammonia.

The Allied Chemical logotype recently received official recognition from the Patent Office as a trademark of the company.

•

Tire Yarn Cut: Following the lead of U.S. tire yarn producers, Courtaulds (Canada) Ltd. has reduced prices 5¢/lb. on Tyrex tire yarn and Tenasco rayon yarn. The new tabs are 63¢/lb. for 1100-denier, and 57¢/lb. for 1650-denier Tyrex tire yarns, and 56¢/lb. for Tenasco 201 (1650-denier) rayon yarn.

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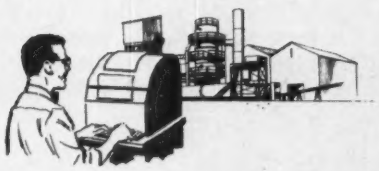

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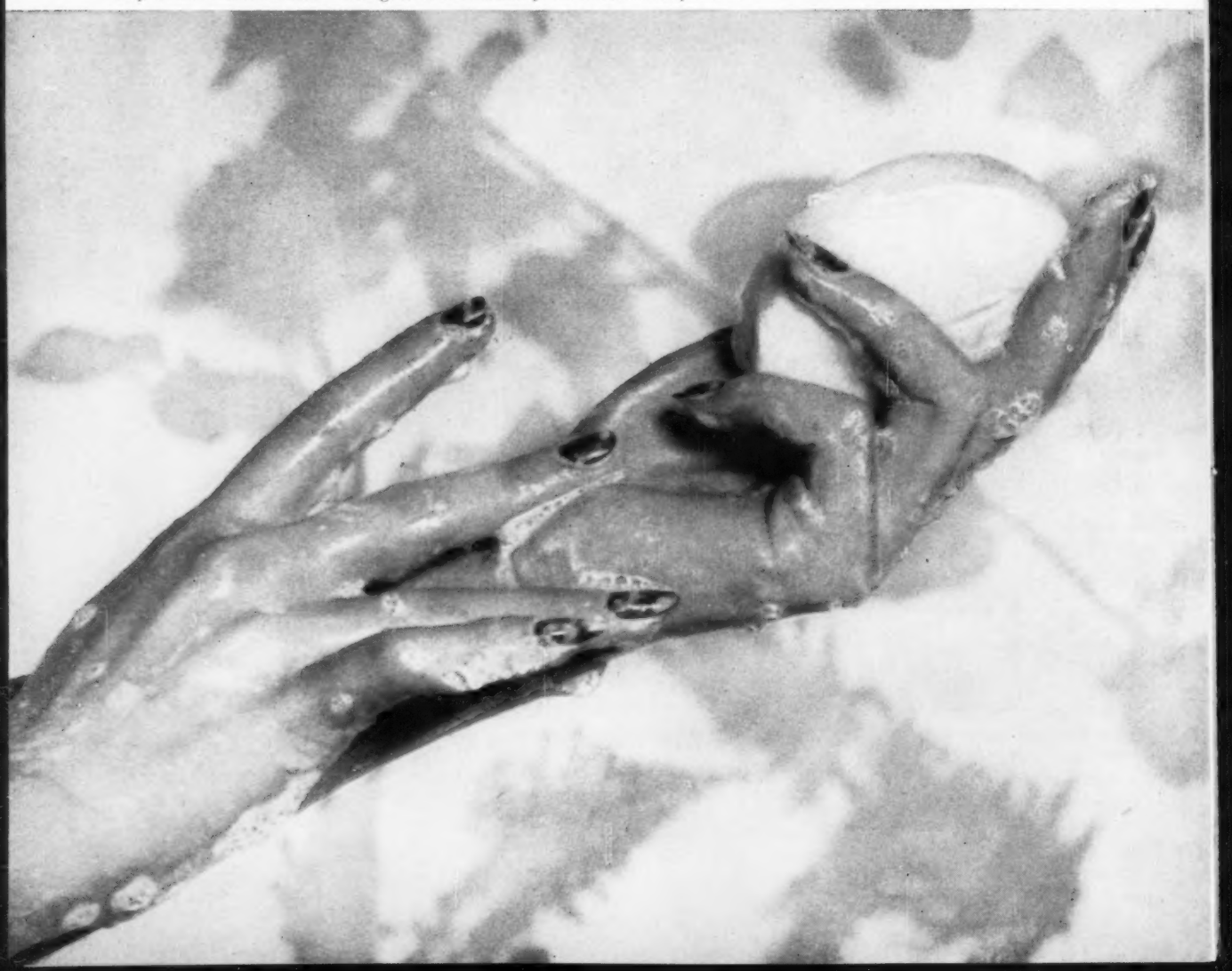

Market Newsletter

CHEMICAL WEEK
January 16, 1960

Sohio Chemical last week hacked acetonitrile prices to all-time lows—a complete cost schedule well in advance of expected production startup. The move heralds the firm's entry into the aceto business.

When acetonitrile starts rolling from the firm's new Lima, O., plant "sometime in the first quarter of '60," buyers in most of the U.S. East and Midwest (so-called Zone 1) will get the chemical for 32¢/lb. in tank cars, 35¢ in drums (full truck or carloads), 36.5¢ l.c.l. (more than 12 drums) and 37¢/lb. l.c.l. in lots of one to 12 drums.

Zone 2 tabs (all states west of and including Idaho, Utah, Arizona) will be somewhat higher: 34.5¢/lb. in tank cars, 37.5¢ in drums (full truck or carloads), 39¢ l.c.l. (more than 12 drums), and 39.5¢/lb. l.c.l. for one to 12 drums. All prices f.o.b. Lima—freight allowed and prepaid.

These tabs are in striking contrast with previously prevailing prices ranging from 43¢/lb. in tanks to 45¾¢/lb. l.c.l. (works).

Union Carbide moved quickly to reduce its acetonitrile prices to the new competitive level, discarding a schedule that had been rock-steady for at least the past eight years. The other producer—Reilly Tar & Chemical—is not a factor in pricing, makes only occasional spot sales of accumulated by-product acetonitrile.

Reason behind the drastic acetonitrile price markdown, says Sohio, is the conviction that expansion of aceto markets has for long been curtailed by too high a price.

Best available estimates put current demand for acetonitrile at some 700-800,000 lbs./year. Rough breakdown: manufacture of vitamin B_1, 150-200,000 lbs.; steroids and quaternaries, 100-150,000 lbs.; butadiene, 200,000 lbs.; spinning solvent for acrylic fibers, 150-200,000 lbs.; isoprene purification, 3-5,000 lbs. Possible market potential: 7-10 million lbs./year by '65.

•

What's behind the 3.49¢/lb. price cut on acrylonitrile which brought tank car prices down to 23¢/lb., carloads to 26¢, and l.c.l. to 27¢/lb., effective Jan. 1? American Cyanamid—which initiated the reduction—adamantly refuses to explain its action.

However, unearthing of valid reasons isn't difficult. Du Pont recently revealed its intent to become self-sufficient in acrylonitrile (*CW, Oct. 24, '59, p. 26*)—at a time when acrylo already was in sizable overcapacity. Now imminent production of acrylonitrile by Sohio Chemical (at the same Lima, O., plant where acetonitrile will be made) adds a new note to the roughening competitive picture.

Confirmation that American Cyanamid was in fact reducing

acrylonitrile prices last week stirred similar price-cutting action by other producers. And although Sohio has not yet committed itself officially on acrylonitrile prices, the word is that the firm will "undoubtedly go along with the 23¢/lb. price."

•

U.S. plastics output increased 25% in '59, to 5.6 billion lbs.—substantially more than the 10% growth envisioned earlier in the year—according to the Society of the Plastics Industry. SPI figures that output in '60 will rise 15%, attributable partly to probability of a 25% expansion of industry capacity.

All but one plastics use area shared in the over-all demand upsurge. The exception: plastics mold making; however, demand for molds was increased in late '59, so '60 prospects now look good.

SPI's estimates of plastic production in '59 by end-use (million pounds): cellulosics, 158; phenolics, 610; polyesters, 150; polyethylene, 1,200; polystyrene, 910; urea and melamine, 400; vinyls, 1,100.

•

The Dept. of Commerce wound up its '60 business outlook with these observations:

• Sulfuric acid had a gross output of 18 million short tons (100% sulfuric) in '59; that's 4% more than in '58. However, "serious" problems—especially a 35% overcapacity—confront the industry. Other problems: squeezed profit margins, rough competition, higher manufacturing and distribution costs, uncertainty about sulfur prices.

• Another prosperous year is shaping up for alkalis and chlorine. Sales will likely be about 5% higher than in '59 although new plants abroad will shave exports.

• For plastics, the Commerce Dept.'s outlook is less optimistic than that of SPI. Commerce sees a 10% increase in '60 rather than 15%.

•

Tariffs or quotas on lead and zinc are the only way to "prevent complete obliteration" of production in the U.S., Sen. Robert Kerr (D., Okla.) reported. Kerr describes the "critical condition" of the industry as "recognizably worse than at prior times when the [Tariff] commission was unanimous in its findings of serious injury."

SELECTED PRICE CHANGES—Week Ending January 11, 1960

	Change	New Price
UP		
Aluminum paste, lining, extra fine, dms.	$0.015	$0.71
Coconut oil, crude, tanks, Pac. Coast	0.005	0.18
DOWN		
Oleic acid, dbl.—dist. (white), tanks	$0.005	$0.15
Stearic acid, dbl., pressed bgs.	0.005	0.1575

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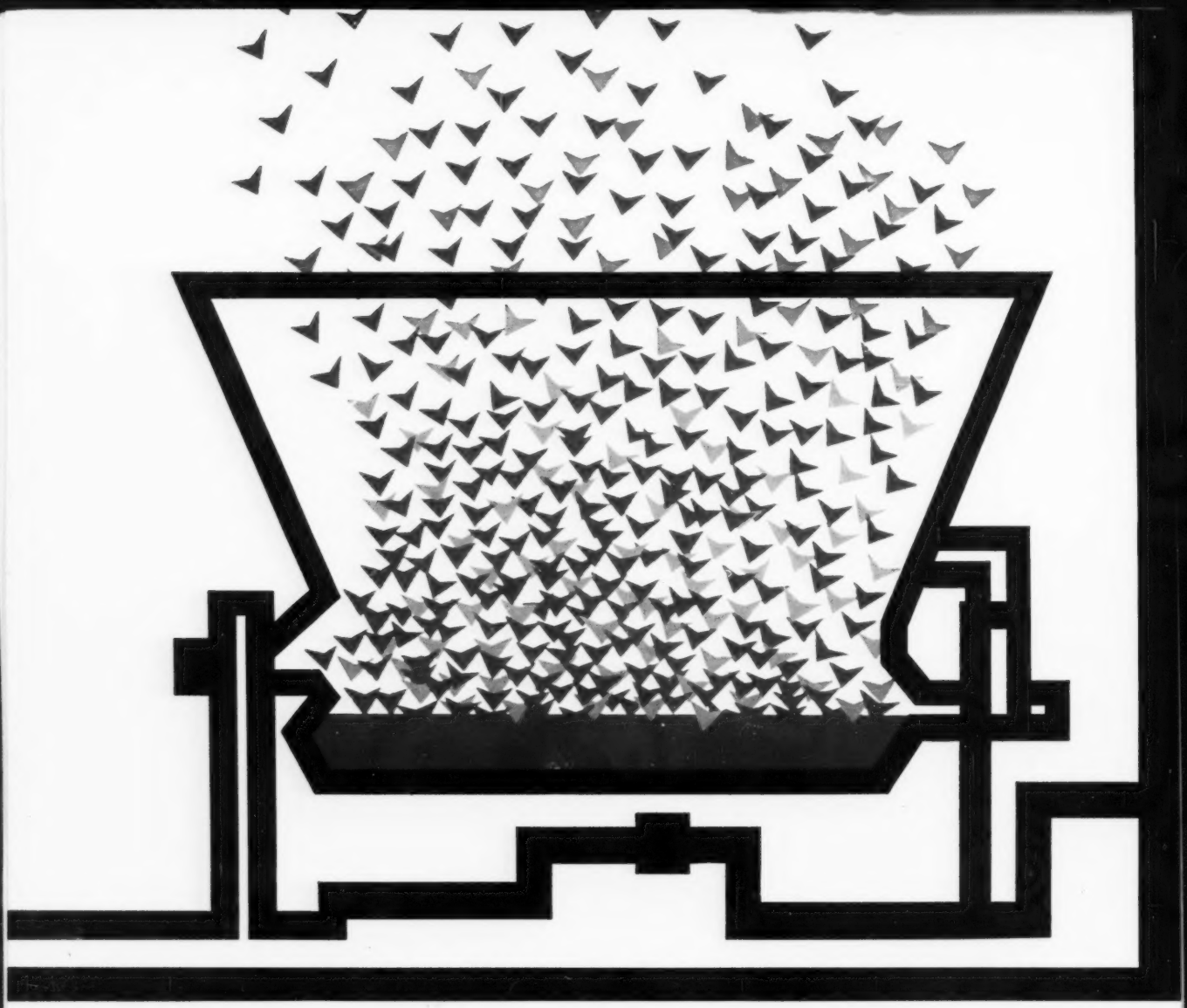

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Explosion touches off ammonium nitrate shipping controversy

PRO

"Ammonium nitrate is not an explosive, but it's being denounced as if it were. Dynamite producers would like to shackle ammonium nitrate with all sorts of punitive, costly regulations and increased freight rates. The industry desperately needs a broad educational program to clear up all the confusion."

CON

"Ammonium nitrate is a dangerous explosive and should be shipped as an explosive. Unless we clamp down on this menace now, occurrence of another Texas City or Roseburg, Ore., disaster is only a matter of time. Nitrate producers are putting selfish commercial interest above the public welfare."

UPI

Last summer's blast at Roseburg, Ore., intensified concern over safety of ammonium nitrate in transit.

Stiff Shipping Rules Menace Nitrate Sales

Ammonium nitrate producers—closing out a record year with sales estimated at 2.7 million tons—last week were gathering forces to combat a serious threat to sales: charges by some explosives producers and state and local officials that ammonium nitrate (AN) presents safety hazards under certain methods of handling and shipping. Upshot could be restrictive legislation, freight-rate hikes, sharply-reduced fertilizer sales.

The immediacy of the threat is typified by a comment to CHEMICAL WEEK last week by the Bureau of Motor Carriers of the Interstate Commerce Commission. The agency said it is "seriously considering changes" and may "announce these soon."

Afterblast Effect: Part of the stigma sitting over AN results from last summer's devastating explosion at Roseburg, Ore., which was erroneously reported to have been caused by ammonium nitrate. The material actually was Carprill—an AN-compounded blasting agent, also containing fuel oil, ground walnut shells.

Since that incident, many local, state and federal regulatory agencies have re-evaluated their safety rules concerning explosives.

Joining the battle, some explosives producers are insisting now that AN be classified as an explosive. But, AN producers steadfastly hold that their product—without a carbon-containing material—is not an explosive, should not be classified as such.

Do-It-Yourself Blasting: Key to the growing controversy is the rapidly changing market for fertilizer-grade ammonium nitrate (FGAN). At one time, it was used almost solely as a plant nutrient; nitrates to be compounded into explosives were produced in the more costly industrial grade. But during the mid-'50s, blasters learned to compound FGAN into do-it-yourself blasting agents for use at the blasting site.

Growth of such uses has been phenomenal; FGAN sales for this purpose shot from 119 million lbs./year

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in '54 to nearly 800 million lbs. last year—a 570% spurt. Prime reason: FGAN costs about one-third to one-quarter as much as conventional "packaged" dynamites. In the same '54-'59 period, total AN sales rose about 57%, from 1.75 million tons to 2.74 million tons/year.

Moreover, FGAN shook the foundations of the explosives industry by taking more than 30% of that total business during this period.

Nitrate Makers' Views: But in selling FGAN for field-mixed blasting agents, nitrate marketers have been caught in a curious squeeze. While they sell and ship a fertilizer material, it is their customers—local jobbers and blasters—who mix it with fuel oil (or practically any carbon-containing substance) to prepare blasting agents. Past experience, like the Roseburg disaster, indicates that fertilizer makers often are blamed for the trouble even though they long since have passed control of the product to others.

Nitrate producers point out that Interstate Commerce Commission regulations classify ammonium nitrate as an oxidizing material—one that's able to assist the burning of other materials, but is very difficult to ignite and practically impossible to burn.

AN makers readily admit that the addition of fuel oil creates a special hazard. But they emphasize that the product is then no longer pure AN, but rather a potentially dangerous agent and should be handled as such.

Safety officials for ICC's Bureau of Safety and other groups (e.g., National Board of Fire Underwriters, National Fire Protection Assn.) support that view.

What is most sorely needed, say these officials, is broader knowledge and enforcement of current regulations, not new ones.

Ready To Blast: Explosives producers, concerned about the serious inroads FGAN has made on their "packaged" explosives sales, see the whole situation differently. In contending that ammonium nitrate should be regulated as such, one explosives producer says: "Unless we clamp down on this menace now, another disaster like that at Texas City or Roseburg is just a matter of time."

Explosives makers feel that uncompounded AN has become hazardous because recent changes in the anti-caking coatings for fertilizer-grade AN have made it far more susceptible to detonation.

For many years, AN producers have coated the material to ensure its free flow. But safety experts claim that organic, carbon-containing coatings have heightened AN's sensitivity to heat and shock.

It would seem that in blasting, the added sensitivity is a plus, but many blasters say they prefer the full-size conventional booster to detonate the AN. Nevertheless, some makers reportedly are turning out a more sensitive—and quite likely, more dangerous—product, with the result that shipment is made somewhat more hazardous.

Battle Lines Drawn: Explosives producers are clearly set to continue their fight against ammonium nitrate by urging tighter shipping regulations.

Already AN producers fear a rash of local ordinances by "righteous but uninformed city fathers" hoping to prevent disasters in their communities. Soon after the Roseburg explosion, for example, the League of Oregon Cities moved to tighten up on regulations; others are likely to follow suit.

While more stringent shipping regulations would undoubtedly boost handling costs and encumber shipping, AN marketers are more worried that tighter rules for AN in general will seriously hamper their main goal: continued high fertilizer sales (fertilizer uses account for over 85% of the AN sold in the U.S.).

Behind their fear: knowledge that any strict regulations of FGAN could easily spur an increase in the low freight rates they've had for years. (Rates for FGAN are about one-half those for industrial-grade material, one-fourth those for conventional explosives.)

Call to Action: Besides the many regulatory and safety agencies involved, several prominent trade organizations have taken up the controversy. Among them: Manufacturing Chemists' Assn., National Plant Food Institute (NPFI), Institute for Makers of Explosives (IME).

IME is pushing hard (but quietly) for stricter shipping regulations on fertilizer-grade AN. Its explanation: they already treat AN as an explosive, figure it's the only safe approach.

NPFI—aware of the threat to fertilizer users and of the hazards of

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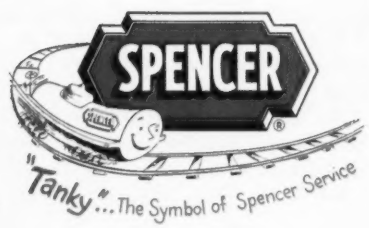

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PENNSALT AMMONIA is made at Wyandotte, Mich., and Portland, Ore.

shipping sensitized AN—favors a testing scheme whereby AN would be checked for its sensitivity to heat and shock, other safety characteristics.

But for MCA, the problem so far has been a knotty one, promises even more headaches. Split into rival factions, MCA has had difficulty getting a constructive program under way.

Result: their educational program has been pigeonholed for the present. Meanwhile, the MCA technical committee on AN is pushing two projects to improve the situation:

(1) It's supervising the revision of MCA Manual A-10 on AN, hopes to have it completed for "very wide" distribution in several months. MCA is mum on the approach it will take.

(2) It's working with National Fire Protection Assn. and National Board of Fire Underwriters in striving to gain acceptance of a "model ordinance" for the guidance of community officials.

Meanwhile, AN maker Spencer Chemical Co. has launched its own efforts to segregate field-mixed AN-containing blasting agents from straight AN. Object: to keep FGAN free from any punitive legislation or regulations.

Spencer is proposing that industry approve the generic term "carbonite" for AN-containing blasting agents. This would be followed by a nationwide advertising and publicity campaign to acquaint the public with the new term.

It's no secret that Spencer's proposal is not being supported strongly by other AN makers. Some of them share Spencer's general feelings, but balk at the term "carbonite." They contend that ICC's present classification for such blasting mixes—nitrocarbo-nitrate—is adequate.

Ahead: Industry observers admit that even after years of exhaustive study, safety and explosives experts cannot fully agree on the hazards of handling AN. And newer coating methods that sensitize AN apparently have confused the situation even more. For these reasons, it's not surprising that many U.S. officials are now reexamining basic regulations for handling AN.

But these same observers figure the industry will have to settle some of its differences, face the problem objectively, if it is to enjoy continued sales.

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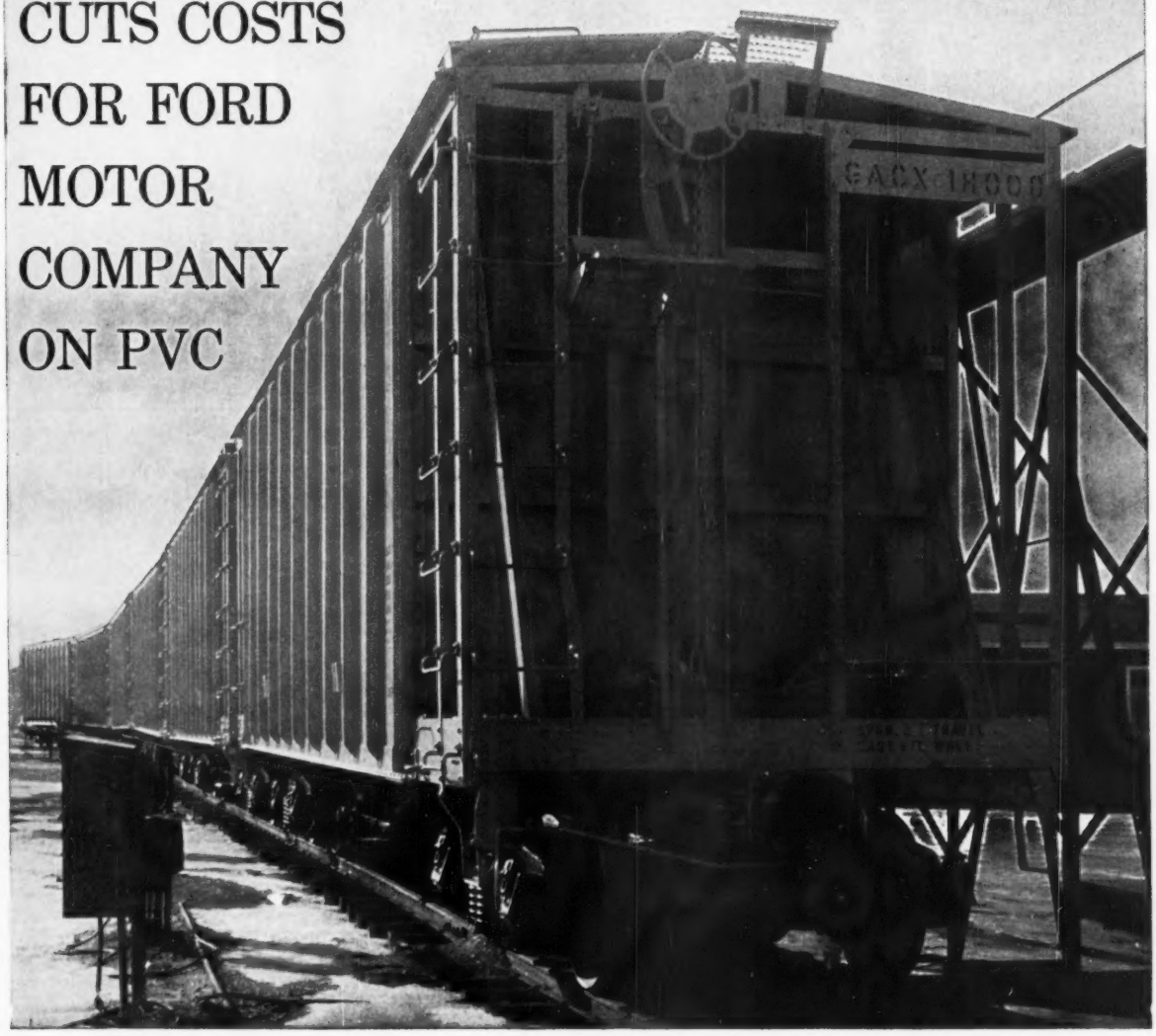

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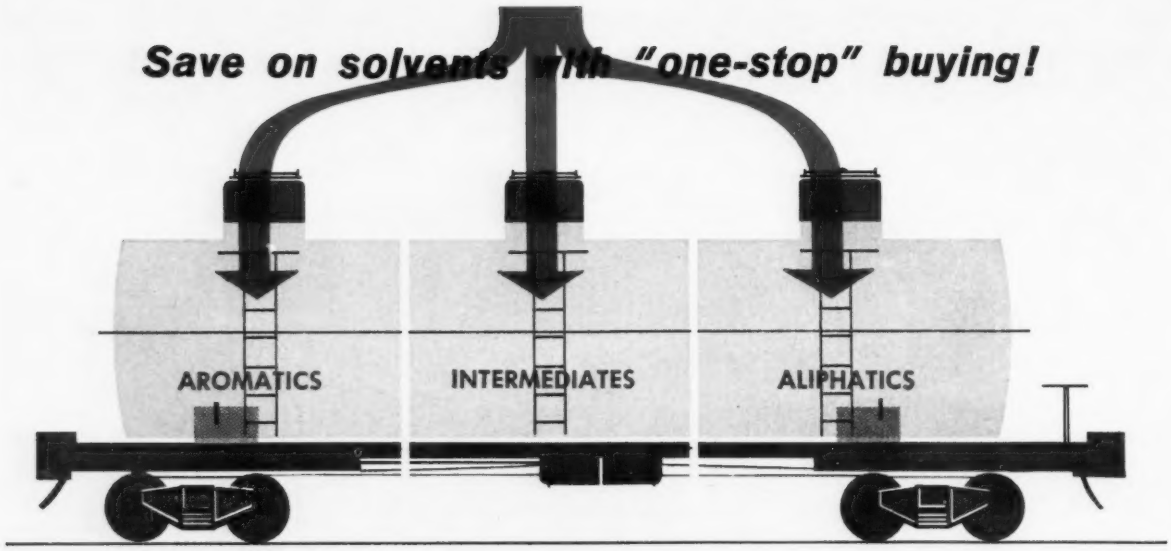

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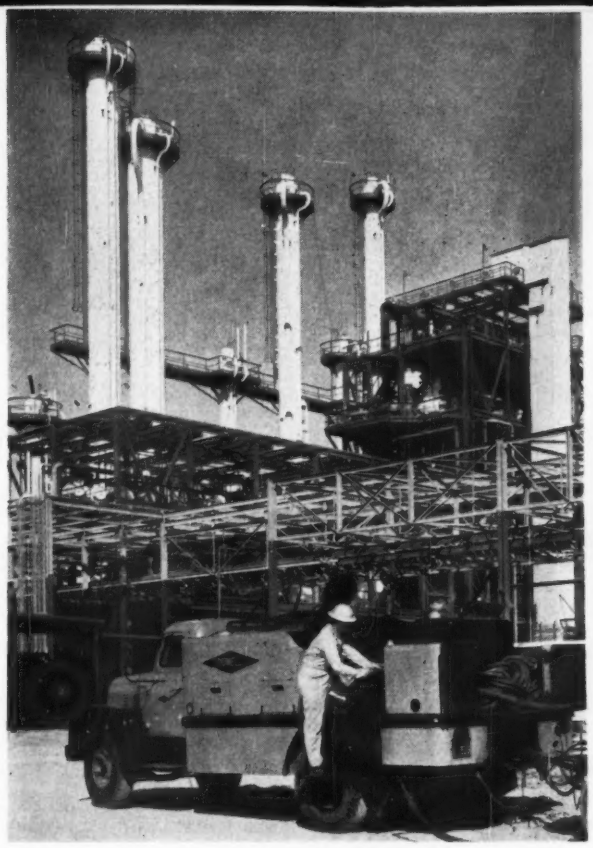
- *Improved techniques, and cleaning agents help chemical cleaning chalk up big gains.*
- *Dow contract-cleaning group's split-off from Dowell Division reflects growth of this activity.*
- *And business has grown 40-50% for another contract cleaner over last three years.*
- *Do-it-yourself cleaning, backed by sellers' technical service, is also burgeoning.*



Chemicals: New Favorite for Plant Cleaning

The chemical cleaning of plant equipment pictured above will be repeated many times—but with one major change. The name on the truck will be Dow rather than Dowell. The changeover, in progress this week, reflects the growth of Dow's chemical cleaning group, also reflects the growing field of in-place chemical cleaning of process equipment.

Dowell has been in the van of contract cleaning for years. It made its first experimental move away from oil- and gas-well servicing into industrial equipment cleaning in Aug. '35, moved in commercially in '39. "The industrial chemical service successfully developed by Dowell has grown steadily over the years and now has reached the point where a separate organization is required to handle its activities. . . . This arrangement will permit Dowell to give increased attention to its highly specialized work of servicing oil and gas wells . . . ," says Leland Doan, Dow's president.

The firm's Industrial Service Division will also provide consulting services and will sell products for waste and water treatment, but these are considered logical additions to, rather than basic reasons for, forming the new division.

Other companies confirm that the chemical cleaning business is burgeoning. For example, Stanley Rose, vice-president of Sumco Engineering, Inc. (Caldwell, N.J.), says Sumco's consulting and contract cleaning services, begun 16 years ago, have increased 40-50% in the last two to three years.

Oakite Products, Inc. (New York), which sells cleaning chemicals and provides technical service but not contract cleaning, estimates its sales in this field at about $1 million. The largest portion (about 20%) of all its technical service laboratory work is for chemical and petroleum equipment cleaning. "We get three or four problems a week now; 15 years ago, we had no business in this area," says Charles Rack, manager of the technical service department.

Easy Beginnings: Chemical cleaning techniques for process equipment were developed chiefly in the petroleum industry in the '20s. "Refinery cleaning problems are usually much easier to solve than those of chemical plants. Refineries don't make the wide variety of complex products," says Rack.

But there are obvious labor savings in cleaning equipment in-place with chemicals rather than using mechanical methods, which usually require equipment dismantling before parts are scraped, rodded out, brushed, or sandblasted. Moreover, as chemical cleaning techniques have been improved and new cleaning products developed, chemical plants themselves have switched to using chemicals for cleaning.

But some problems still can't be solved chemically. Rack says about 10% of the soils received at Oakite fall into this category. Heat exchanger tubes that are completely plugged still must be mechanically cleaned.

The descaling of equipment in water service (e.g., boilers and the water side of heat exchangers) is most common. The largest number of companies in the chemical cleaning business specialize in boilers. Of the companies cleaning a broad range of equipment, heat exchangers still provide the basic demand. Sumco's experience is probably typical—30-50%

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of its work is cleaning heat exchangers.

The procedures for descaling water-service equipment are standard, depend on analysis of the water used. The problems of cleaning the parts of equipment that are in contact with the product require more specialized study. For example, carbon deposits can't be broken down by chemical cleaning. Attempts to dissolve calcium sulfate deposits chemically would probably result in damage to the equipment. And magnetic iron oxide (an inorganic polymer of indefinite structure that may be the result of high process temperatures, says Oakite) can't be dissolved chemically.

If the soil can't be dissolved completely, the only other means of chemically dislodging it are by breaking the soil's binder, or dislodging big chunks of soil by breaking the bond between it and the metal. The chunks of undissolved soil are then flushed out of the equipment.

The Big Choice: Mechanical cleaning is usually performed by the plant maintenance staff. But chemical cleaning is seldom done without some outside help. The choices: obtaining assistance for the plant crew from companies such as Oakite, Wyandotte Chemicals Corp. and The Penetone Co. (Tenafly, N.J.) in selecting the proper chemicals and procedures for cleaning, or hiring contract cleaning firms such as Dow and Sumco to perform the entire job.

Both types of cleaning service companies heavily stress the advantages of their type of service. And chemical plants run the gamut—from exclusively using contract services to obtaining assistance only when they can't solve their own problems.

Contract service companies stress their use of personnel specially trained in cleaning. Chemical companies agree that trained personnel are worth paying for. As one chemical company points out, some of its equipment has been damaged because its own staff did not neutralize the system quickly enough after cleaning. Another chemical company likes to let the contract cleaner deal with hazardous cleaning chemicals—its own personnel are not familiar enough with them.

The contract cleaners point out that equipment, as well as the chemicals, is highly specialized (e.g., solvent-resistant pumps and high-volume, high-

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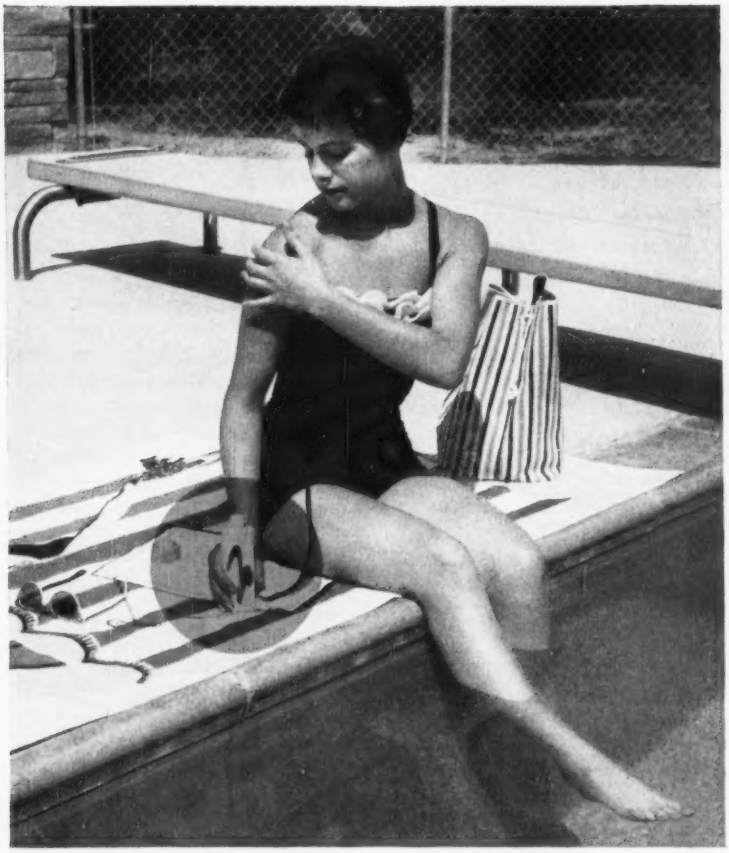

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pressure equipment), not available at many plants.

And a chemical company reports that contract cleaners help prevent wide fluctuations in the size of its staff. Its own maintenance staff performs chemical cleaning jobs only when they have no other jobs to do.

Suppliers' Pitch: On the other hand, firms that sell cleaners and supply technical service stress that they offer a wider variety of cleaners than the contract companies. They send an experienced service man (sometimes an engineer) to the plant. The service expert recommends equipment, hookups, circulating times and temperatures and pressures for the cleaners.

The chemical sellers usually guarantee recommended products, will settle by returning the cost of the product to the user. Contract cleaners also guarantee their service.

Complementary: While the larger contract cleaners make most of their own cleaning compounds, some of the smaller ones buy theirs. At least to this extent, the contract and cleaner-selling services are complementary.

Firms such as Dow, Oakite and Wyandotte operate throughout the country, have many sales offices or equipment dispatch points but often only one technical service laboratory (e.g., Dow's will remain at Dowell's Tulsa headquarters for the time being; Oakite's is in New York; Wyandotte has one at Wyandotte, Mich., another at Los Nietos, Calif.).

The smaller companies claim advantages for operating in a local industrial area. For example, Sumco is on the East Coast; McCormick Chemical and Inspection Co. is in San Leandro, Calif.; Halliburton, in Los Angeles, covers California, mainly refineries. The Houston area has about 10 local firms, including Marine Industrial Engineers and Chemetics.

Dow, even with its numerous offices throughout the country, is well aware of the advantages of local-area identification, has moved some local offices, consolidated others. Its main reason for picking Cleveland for headquarters is "because that city is near the center of an industrial area in which the division's services are in most demand." And if the trend of the last few years is any indication, the demand for chemical cleaning will continue to grow.

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Want To Sell in The Growing Export Market? We are fully equipped to handle accounts on an exclusive basis, and invite inquiries from principals in the chemical industry. We are the Import/Export affiliate of Carlisle Chemical Works, Inc., Reading, Ohio, and its division, Advance Solvents & Chemicals, New Brunswick, N.J. Our present principals include: Cadet Chemical Corp., Harry T. Campbell Sons' Corp., Cowles Chemical Co. (Heavy Chemical Department), John R. MacGregor Lead Co. and Titanium-Zirconium Co. If you are a manufacturer of raw materials or intermediates for the chemical process industries, and are looking for active, experienced representation in the export market, write to: Advance International Ltd. 245 Fifth Avenue, New York 16, N. Y. Telephone: Oregon 9-2663.

More Sales . . . Processing Industries. An established manufacturers representative now serving two leading equipment manufacturers wishes to add one more line that can be sold to the processing industries. Concentration and penetration coverage of Metropolitan NYCity—New Jersey, Eastern Pennsylvania and Baltimore area is assured. If you have a reputable product we can increase your sales at low cost. RA-3360, Chemical Week.

Export To Europe/Common European Market Reputable Dutch Firm looks for Representations of Chemical and Pharmaceutical Works. Also interested in industrial Chemicals and in new Chemicals for the Plastic-Industry. Good references available. Please apply to: United Trade Agencies "UTAG", 545-549 Herengracht, Amsterdam, Holland.

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Custom Grinding-Ultra Fine or Course-Specialty or Volume Blending and Grinding service on unit or contract basis. Complete CO² installation for Nylon, Teflon and Heat Sensitive Materials. A Cramer Corp., 10881 S. Central Avenue, Box 682 Oak Lawn, Illinois.

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Quality private label paint manufacturer. Our formulas or yours. Box 128, Bedford, Ohio.

FOR SALE

$3,000,000 Liquidation-Chemical Plant at Orange, Texas. Type 316 Stainless Steel Tanks, Kettles, Heat Exchangers, Columns, Stills, Crystallizers. Centrifugals, Pumps, Valves, etc. Wonderful Values. Send for list. Perry Equipment Corp., 1415 N. 6th St., Phildelphia 22, Pa.

1960 sq. ft. T316 SS horiz. heat exchanger, (468)—1" tubes ASME 75# WP tubes, 50# WP shell. Perry, 1415 N. 6th St., Phila. 22, Pa.

Vulcan 11' x 10' x 175' long rotary kiln, ¾" shell, two tires. Perry Equipment Corporation, 1415 N. Sixth Street, Philadelphia 22, Pa.

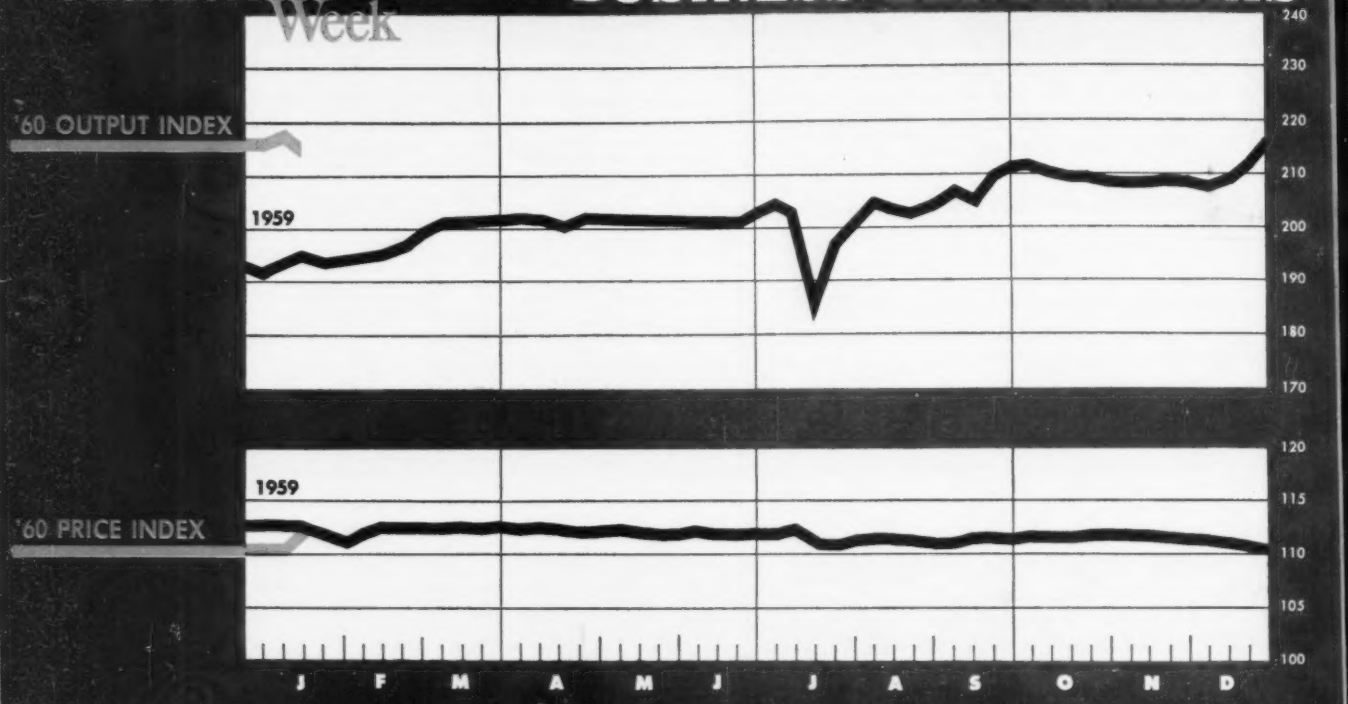
DBS Plast., Virgin Bulk 35¢. Barium Hydrox. N.F. (J. T. Baker Orig.) 15 Leverpaks $.06/lb. Triethylene Glycol Dicaprylate 10 drums $.18/lb. Toluol 10,000 gals. $.20/gal. Type "S" Anti-Freeze $.39/gal. (in drums). 2 orig. drs. Polyethylene Gly. 1000, Monostearate $.20/lb 3 orig. drs. Barrett Pyidine 15A $.35/lb. O/S 2000 gls mixed Phthalate-Phosphate Plasticizer 20¢ lb O/S 500 gls TCP Plasticizer 20¢ lb. 3 drs-Isoprene-Enjay virgin 15¢. Ohio Apex KP23 Plasticizer, orig. drs. 12¢ lb. FS-3452, Chemical Week.

WANTED/FOR SALE

This Tracer Section can be used whenever you are looking for or offering Equipment, Plants Supplies, Chemicals, Opportunities, Special Services. The rates are low—just call or write Classified Advertising Division, Chemical Week. P.O. Box 12, N. Y. 36, N. Y. LOngacre 4-3000.

Chemical Week

BUSINESS BENCHMARKS

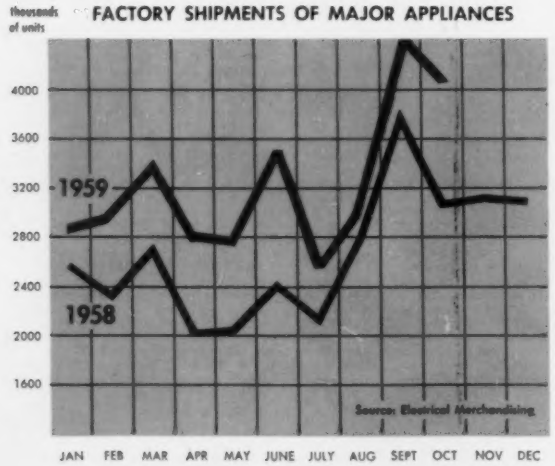


JANUARY 16, 1960

WEEKLY BUSINESS INDICATORS	*Latest Week*	*Preceding Week*	*Year Ago*
Chemical Week output index (1947-1949=100)	214.0	216.0	192.5
Chemical Week wholesale price index (1947=100)	112.6	110.9	111.9
Stock price index (12 firms, Standard & Poor's)	60.88	60.94	48.57
Steel ingot output (thousand tons)	2,707	2,726	2,085
Electric power (million kilowatt-hours)	13,425	13,349	12,364
Crude oil and condensate (daily av., thousand bbls.)	7,068	7,109	7,122

WHOLESALE PRICE INDICATORS (1947-49=100)	*Latest Month*	*Preceding Month*	*Year Ago*
All commodities (other than farm and foods)	128.5	128.4	126.8
Chemicals and allied products	110.0	110.0	110.2
Industrial chemicals	123.9	123.9	123.6
Paint and paint materials	119.0	118.7	118.9
Drugs, pharmaceuticals and cosmetics	93.8	93.8	93.2
Fats and oils (inedible)	52.2	54.5	64.7
Fertilizer and materials	106.6	106.3	105.2

CHEMICAL CUSTOMERS CLOSE-UP



GULF... AND THE REMARKABLE PROGRESS OF PETROCHEMICALS

IN AGRICULTURE . . . Petrochemicals give agriculture the fertilizers that make the pastures lush and green . . . the wheat full and gold. From petrochemicals come the insecticides that guard the crops. Petrochemicals provide components for rubber and finished fuels, oils and greases—to power the ponderous machines that till the rich land. From polyethylene comes irrigation pipe and mulch, machinery covers and silo caps, moisture barriers and pond liners. Fresh paint keeps the silo red and new. Wood preservatives double the life of barns and fences. Synthetic fibers decorate the home.

Everywhere you look on today's farm, you see petrochemicals in action. Without them, modern farming would be set back 50 years. But the petrochemical industry is young yet. What will it do for farming in the *next* 50 years? Triple production? Double the growing seasons? Take the *work* out of farming? If chemistry is your field, these are *your* challenges and the results will be *your* accomplishments. Gulf would like to help you meet these challenges and share in your achievement by providing dependable petrochemicals in the quality and quantity you require. Let us tell you how we can serve you. Write or phone: Petrochemicals Department Sales Office, Gulf Oil Corporation, 360 Lexington Avenue, New York 17, New York.

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Quality Petrochemicals to Begin With

Benzene • Ethylene • Isooctyl Alcohol • Propylene • Propylene Trimer and Tetramer • Sulfur • Toluene

When it comes to

MINERAL ACIDS

SULFURIC ACID
Standard: 60° and 66° Baumé, 99% H_2SO_4
Diamond: 66° Baumé
Reagent, ACS

NITRIC ACID
Diamond: 36°, 38°, 40°, and 42° Baumé
Strong Nitric Acid, 95% and fuming grades
Photo-Engravers' Grade
Reagent, ACS

MURIATIC (Hydrochloric) ACID
18°, 20° and 22° Baumé, Standard, Diamond, Crystal and Reagent Grades

HYDROFLUORIC ACID
Anhydrous, Aqueous 70%, and Reagent

PHOSPHORIC ACID
Wet Process, 65% and 75%, Com'l and Fertilizer Grades
Food Grade, 75%
N.F., 85%

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Varying proportions of Nitric and Sulfuric Acids to meet customers' requirements

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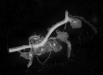
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